

From: SMTP%"SWAI@db1.cc.rochester.edu" 19-APR-1991 13:21
To: ABRIDLE@NRAO.EDU
Subj: thesis proposal

Date: Fri, 19 Apr 91 13:18 EST
From: SWAI@db1.cc.rochester.edu
Subject: thesis proposal
To: ABRIDLE@NRAO.EDU
Message-Id: <8A2E84CF023FC06FBF@DBV>
X-Envelope-To: ABRIDLE@NRAO.EDU
X-Vms-To: IN%"ABRIDLE@NRAO.EDU"

A letter addressing the issues we discussed along with a c.v. was mailed today. You should receive it on Monday or Tuesday. I'll call or email late next week to find out what the initial response is to my proposal.

From: CVAX::ABRIDLE 19-APR-1991 14:26
To: SMTP%"SWAI@db1.cc.rochester.edu",ABRIDLE
Subj: RE: thesis proposal

Sounds good. I'll look for it in the mail and will discuss the situation a.s.a.p. with Bob Brown, who is looking after the program. Based on an initial discussion I have had with him, I think the prospects are good. I gather he had also heard about you from Hugh, so has some background already. Best regards, Alan B.

From: SMTP%"SWAI@db1.cc.rochester.edu" 26-APR-1991 12:05
To: abridle@cvax.cv.nrao.EDU
Subj: thesis proposal
Date: Fri, 26 Apr 91 12:02 EST

Has "snail mail" gotten my letter/proposal to you yet? I guess it is still early for there to have been even an unofficial reaction to it.

From: CVAX::ABRIDLE 26-APR-1991 12:11
To: SMTP%"SWAI@db1.cc.rochester.edu",ABRIDLE
Subj: RE: thesis proposal

I have received the package, and it looks fine. I have passed it on to Bob Brown, who is in charge of the student program, but he has been out of town for a few days and I have not heard his reaction yet. I think the prospects are pretty good, however, and I definitely expect to know by the time you will be here in May. I am optimistic but can't guarantee the outcome just yet.

Alan B.

From: SWAI@db1.cc.rochester.edu
To: abridle@NRAO.EDU
Subject: background reading
Date: Thu, 6 Jun 91 12:56 EDT

Vacation lasted a few days longer than expected but I am ordering BEAMS AND JETS IN ASTROPHYSICS today. I don't expect my progress through it to be blindingly fast since I will be primarily studying for my prelims. I will be sending you a weekly or bi-weekly report on my progress (ie, what my latest questions are) via email. Hugh and I are getting together today so that I can fill him in on how things stand.

From: SWAI@db1.cc.rochester.edu
To: ABRIDLE@NRAO.EDU
Subject: READING
Date: Wed, 19 Jun 91 17:39 EDT

ALAN,

I have ordered "Beams and Jets in Astrophysics" from the book store. They tell me it will take three to four weeks to arrive. In the mean time I will be reading around in the literature. I would appreciate a referral to any good references you find while working on your "Extragalactic Radio Sources" paper. I just read "Extragalactic jets: trends and correlations" and I still have lots of questions. How, for instance, is it that bulk Lorentz factors can account for:

- (i) apparent superluminal motion in VLBI maps
- (ii) one-sidedness of VLBI jets,
- (iii) high brightness temperatures, (how does cm wavelength variability imply these?)
- (iv) "low Compton x-ray fluxes from bright, compact radio sources," and
- (v) misalignment between parsec and kiloparsec scale jets for sources with strong, dominant cores?

I would like to have some idea how bulk relativistic motion in a jet implies the above conclusions

If I had my preference, I would spend the summer immersing myself in literature relevant to jets. However, passing the prelims has first priority. Thois

-oops- This is my second attempt so I'm taking my preparation very seriously.

It seems from your "trends and correlations" paper that if we just knew a little bit more of the important information about jets, then some of the puzzling things would begin to become clear. For instance, why should one and two sidedness of jets be such a strong function of total power of the core? Why is magnetic field configuration correlated with sidedness and hence with core power? Could the core be responsible for generating the large scale magnetic fields which interact with the fatted material or do the jets somehow organize their own fields (the former would seem to correlate more readily with core power)? There really is a pattern here but what is it?

I'll send you another "progress" (or "current questions") report in a couple of weeks.

- Mark

From: abridle (Alan Bridle)
To: SWAI@db1.cc.rochester.edu
Subject: Re: READING
Date: Thu, 20 Jun 91 10:25:13 -0400

Hello Mark, thanks for your "report" and questions.

All of your questions about how bulk relativistic motion can explain the "smorgasbord" of phenomena in compact sources are answered, at least to some extent, in a review article by Ken Kellermann and Ivan Pauliny-Toth called "Compact Radio Sources" in Annual reviews of Astronomy and Astrophysics, vol. 19, p.373-410 (1981). If you can get hold of this, take a crack at it and see how many of the questions remain! For a very succinct statement of the basic physics, see also the article by Roger Blandford and Arie H. Konigl, "Relativistic Jets as Compact Radio Sources" in the Astrophysical Journal, vol. 232, p.34-48, (1979). Section II of this paper says almost everything you need to know about the basic effects, though a bit too tersely to pick it up the first time! If you want to speed-read that paper, you can skip most of section III on "clouds" first time through. Let's talk about details after you've had a chance to look at these.

The correlations with power are indeed a fundamental part of the "jet problem". Their presence in the data is what provoked me into concentrating so much on jets through the 1980's. I think that the underlying trends are for both Mach number and velocity to increase with the power output of the central engine, and one of the biggest questions now is whether the large-scale one-sidedness comes from intermittency in the engine or from bulk relativistic effects ("Doppler favoritism" of the approaching side of the flow). One possible project for you is to put together statistical tests to examine the "Doppler favoritism" idea using VLA data on a sample of powerful sources.

But as you say, priority #1 should be boning up for your qualifying exam. So don't get too sidetracked, there will be time enough to think about these things once your qualifying exam is successfully behind you!

Best wishes, Alan

From: SWAI@db1.cc.rochester.edu
To: abridle@NRAO.EDU
Subject: reading report
Date: Wed, 3 Jul 91 21:09 EDT

Alan,

I recently received "Beams and Jets in Astrophysics" and I am delighted with it. I have been hopping about reading parts of different sections before I settle down to work through it in a more linear fashion. One of the things that caught my interest is the difficulty in modeling jet collimation. According to Vincent Icke (Chapter 5 - From Nucleus to Hotspot: Nine Powers of Ten), the successful models of jet collimation are ballistic models. He also goes on to say such models are not in favor. Our discussions had left me with the impression that there is evidence for self organization of the magnetic field to promote jet collimation. How strong is that evidence? Another source of collimation could be the appropriate large scale organization of the magnetic field but how this happens on the scale Icke is talking about is hard to imagine.

Now for a question about the "cocoon" or "backflow" models of jet propagation. How does the whole jet-cocoon system get started? Does the jet immediately start building a cocoon which allows it to propagate yet farther? if this is the case, we ought to be able to see cocoons around jets for most of their length. My recollection of the pictures you showed me is that jets are not entirely shrouded in cocoons and that they might have propagated a non-trivial distance before reaching the cocoon assisted propagation region. Perhaps, we can only detect the cocooning material near the end of the jet when in reality it encases the jet for it's entire length. Is it possible to test the cocoon model by studying the structure of the cocooning material?

Thank you for the references in you response to my last report. Hugh and Dan are giving me home work assignments which are prelim/thesis oriented. My first was to learn the four-vector formulation of E&M since I had not had that before. It's a very clever system.

-Mark

From: abridle (Alan Bridle)
To: SWAI@db1.cc.rochester.edu
Subject: Re: reading report
Date: Mon, 8 Jul 91 11:19:03 -0400

Hello Mark,

Glad to hear your copy of "BJA" has arrived. You'll probably find Cawthorne's chapter on Parsec-Scale jets also helps with the questions in your previous message.

Yes, collimation and stability over 9 powers of ten remain a major question, and Icke is quite correct in complaining that people may be seducing themselves into believing too much on the basis of numerical models that only extend for a few decades in jet length/width ratio. Also that the collimation has been forced in these models by the initial conditions. They do, however, identify two main flavors of jet propagation that Vincent might have said a bit more about. One of these is entrainment-dominated, and probably applies to the plumed low-power sources. As he points out, entrainment can be sudden death to a relativistic jet; fortunately these are not the sources in which there is any evidence, or need, for bulk relativistic velocities. The other is cocoon-forming, and the suggestion from present models is indeed that cocoon formation prevents direct contact between the jet and the external medium; the jet ends up propagating through a cocoon of its own waste material. If the jet is much lighter than the surroundings, it will begin cocoon formation immediately, so at all stages the jet is travelling at high speed through a slower-moving, or backflowing, cocoon that it is inflating. The external medium stays outside the contact surface with the cocoon (though there are interesting questions about the shape and stability of the contact surface over large scales and long times). In this case, ongoing collimation of the jet must be a two-stage process - the external pressure gradients must help to shape the cocoon (e.g. by keeping it "squeezed" toward the end of the jet) while the cocoon itself reacts back onto the jet. This two-stage process is not well-modelled at the moment. The numerical work doesn't address it on anything like the right range of scales. The analytical work (mostly getting a bit dated now) is really talking about the low-power sources, where the external pressure acts directly on the outflow.

The organization of the fields is a classic chicken-and-egg problem. Does the flow organize the fields by "combing" them, or do the fields organize (or help to organize) the flow via $J \times B$ forces? The impetus for the MHD simulations was the hope that we might detect some strong signatures of the latter case. The results so far have been from 2-d MHD codes (though there is now a 3-d code running at Illinois thanks to Mike Norman and David Clarke) and Icke is properly skeptical about them. They do however agree that there is a trend toward forming a quasi-ballistic "nose cone" in the field-dominated case and that this strongly inhibits cocoon formation. If the 3-d MHD confirms this (i.e. if there is not a whole new parameter space opened up by effects that depend on the azimuthal coordinate around the jet) then it may be that the field-dominated case applies only to the well-collimated "naked jets" that we see in a few quasars. Then a major question is: "are these jets naked because they are field-dominated, or do they merely look naked because they are brightened relative to their cocoons by relativistic effects?" Certainly the jets that are good candidates for being field-dominated because of their apparent "nakedness" are

all also strongly one-sided. In most quasar and radio galaxy jets, the cocoons are quite visible (especially for the galaxies). At least on the conventional wisdom, this is evidence against the fields being dynamically dominant and for their high degree of organization (inferred from high polarization) being the effect of field combing rather than cause of good collimation.

This is, however, one of many "tilts" in the conventional view that I see as plausible rather than obligatory, and Icke's chapter contains nice reminders of why one should still be open-minded about this.

The actual evidence for high degrees of polarization in high-power jets is also rather limited, because you need good transverse resolution on the jet to explore it properly. Cyg A's famous jet, for example, has not been well resolved in the transverse direction. One of the better-resolved cases in a strong source is one that I have been working on, 3C219 (see *Astron.J.*, vol 92, p.537 and 538). I have just got VLA time for a higher-resolution crack at this one at 8.3 GHz, it will be observed some time later this summer.

Best wishes, Alan

From: SWAI@db1.cc.rochester.edu
To: abridle@cvax.cv.nrao.EDU
Subject: report
Date: Mon, 22 Jul 91 13:20 EDT

Alan,

Sorry about the email delay. After some more jumping around, I started reading "BJA" in a more sequential manner. There have been several major distractions recently so I have relatively little to report this time. However, in the next couple of weeks, Dan and Hugh will be concentrating on jets again so I'll be able to devote some more time to jets again for my "homeworks".

Mark

From: SWAI@db1.cc.rochester.edu
To: abridle@cvax.cv.nrao.EDU
Subject: prelims
Date: Tue, 3 Sep 91 14:30 EDT

Alan,

I thought I would resurface briefly to give you a quick update. The written part of the prelim exam will be given Monday and Tuesday of next week (Sept. 9 and 10). In all likelihood, I will have an oral as well which will occur Wednesday or Thursday of the same week. Friday the 13th official notice of the exam results is given. As soon as I know the outcome I'll email you however, I am assuming that it will be satisfactory. It will certainly be a relief to get this over.

- Mark

From: abridle (Alan Bridle)
To: SWAI@db1.cc.rochester.edu
Subject: Re: prelims
Date: Tue, 3 Sep 91 15:48:05 -0400

Thanks for the note. I hope all will go well for you!

Best wishes, Alan

From: abridle (Alan Bridle)
To: SWAI@db1.cc.rochester.edu
Subject: Re: visit
Date: Thu, 26 Sep 91 18:26:35 -0400

Either the October or around-Thanksgiving times would be o.k for me, but there are a few constraints:

I'll have a visitor here from the 25th to the 27th of November, David Clarke from U. of Illinois who is working on numerical MHD models of jets in three dimensions. We'll be trying to get some data reduced and some theoretical ideas discussed, so there would not be time on those days for you and I to go into details re your thesis possibilities - but it might be very useful for you to sit in on our discussions while David is here. Wayne Christiansen from North Carolina may also come through here on those same days to make it a three-way discussion about jet and lobe physics. So if you do come in November we should review your thesis topics either before the 25th or after David leaves on the 27th, and you might like to sit in with us on the 25th and 26th. Would this create problems with your Thanksgiving plans? If so, it would be better for me if you came the following week (starting December 2nd) if you can be away from your TA work then.

For October, I'll get back to C'ville late on the 16th, and will have the 17th and 18th free. I agree that if you'd like to take more time to think things over and read, it would be better to wait until you feel you've done that satisfactorily.

Have you thought any more about when you'd like to move here? You should probably know that this place will be very chaotic for the first 6 months of 1992. There are about a dozen people coming here from all over the world to participate in a new image-processing software project. We'll have the place bulging at the seams with visitors and every office corner and workstation in the place will be in huge demand. Things should be vastly saner by May or June. I will also have to put a lot of time into this software visitation as the project is one of my responsibilities around here. So it will be much saner if you plan to start here later rather than sooner. The scale of this project, and its impact on space and resources in this building, has magnified enormously in the last month or so, which is why I didn't mention it before. If you move down here in mid-summer or thereabouts, only the remnants of this chaos should remain here. One of the remnants should be a SPARC station that I have asked the computer division to earmark for you to use, and a desk to put it on and a chair to sit at!

Cheers, Alan

From: SWAI@db1.cc.rochester.edu
To: abridle@cvax.cv.nrao.EDU
Subject: thesis topic/rochester computer resources
Date: Wed, 6 Nov 1991 11:42 EST

Alan,

I am leaning toward doing the single source project. Is the designation of the source 3C 253 or 3C252; I don't recall. On issue we talked about before was the necessity of return currents if the jets did not have a net neutral charge. Wouldn't these return currents be seen? Presumably we should see synchrotron radiation from the return currents. If the jets have a net neutral charge, it seems that they would most likely be made up of electrons and protons or electrons and positrons. If the jets were made up of electrons and positrons, then I would expect to see x-ray recombination lines associated with the lobes where the jet material slows down. If the jet is an electron-proton mixture, then I would expect to see H α regions associated with the lobes. Are either the x-ray recombination lines or H α regions seen? All this is operating on the assumption that the jet material slows down enough in the lobes to support recombination. Perhaps when I read further all this will be explained. One of the difficulties I encounter is that as I start reading, my questions far outstrip my reading rate.

I may have a problem with machine access next semester. If I do the 3C 253/2 project, what sort of resources do I need just to get started? Are there things I can do in Rochester during the spring semester which don't require 500 meg of disk? The story here is that AIPS is installed on some of the machines in the Graphics Lab but that it doesn't work fully and the support from the Graphics Lab is non-existent. Also, disk space is limited to a couple hundred meg. Perhaps you could purchase the right to more disk space but I don't know the details. I'

(oops)

I'm keeping my ear to the ground for other spark station possibilities but for the time being, the Graphics Lab is the only resource I have access to.

From: SWAI@db1.cc.rochester.edu
To: abridle@cvax.cv.nrao.EDU
Subject: thesis topic/computers
Date: Mon, 2 Dec 1991 10:14 EST

Alan,

I think I would like to do the single source project. Is that ok by you?

Can AIPS be installed on a SPARC IPC? Does a SPARC IPC (roughly the same as a SPARC 1) have enough horse power? Dan Watson is getting a SPARC IPC in the next month or so. One of his ideas is that I could take it to C'ville in the back of a car and let the AIPS gurus there set up AIPS. Every attempt to set up AIPS at Rochester has ended in failer so far. Also, can AIPS run on an ALIENT?

Mark

From: abridle (Alan Bridle)
To: SWAI@db1.cc.rochester.edu
Subject: Re: thesis topic/computers
Date: Mon, 2 Dec 91 10:55:04 -0500

We have AIPS running on an IPC here. It might be simpler to transfer AIPS binaries from that by ftp. I'll talk to the AIPS guys about it.

From: abridle (Alan Bridle)
To: SWAI@db1.cc.rochester.edu
Subject: Re: thesis topic/computers
Date: Mon, 2 Dec 91 10:56:43 -0500

Do you mean an ALLIANT? AIPS is running on some Alliants in the U.K., I think in a 4-processor version.

From: abridle (Alan Bridle)
To: SWAI@db1.cc.rochester.edu
Subject: Re: thesis topic/computers
Date: Mon, 2 Dec 91 11:28:22 -0500

PS. yes, it's ok by me for the 3C353 project! We should put in some proposals for the new observations you'll need, essentially all configurations at 8 GHz! Stefi Baum (who has been involved in the existing observations) will be here in a couple of weeks and she has some optical spectroscopy on 353. I'll talk with her about optical follow-ups as well.

From: abridle (Alan Bridle)
To: SWAI@db1.cc.rochester.edu
Subject: Re: thesis topic/computers
Date: Tue, 3 Dec 91 15:35:24 -0500

Nope. It languished unstudied for about 20 years by being close to the equator and to the Galactic plane. I'll put together a "fact sheet" for you, but you'll be surprised how little is there! I suggest instead that you read all you can your hands on about Cygnus A and M87, the two best-studied bright radio galaxies. Start with index in "Beams and Jets in Astrophysics" under these sources, and follow all the recent observational references in there, but particularly the radio ones (Owen, Biretta and company for M87, Carilli, Perley and company for Cygnus). Look at what they do with structural data and polarimetry, for jets and lobes, and with multi-frequency observations. Then think about having the VLA data at 1.4, 4.9, 8.4 and 14.5 GHz at least (1.4, 4.9 and 14.5 are already in hand but still some further image improvement needed, 8.4 will have to be proposed and done). I'll mail you copies of our 3C353 proposals and of the poster paper we gave at the AAS a while back. That's really all the 353-specific context that exists, as it's the Forgotten Radio Source because of its double-coincidence with the two equators! (Which no longer matters now we have interferometers in the North-South direction).

The bad news is that there's not much about it in the literature.
The good news is that it's unspoiled territory, virgin forest, etc.

From: abridle (Alan Bridle)
To: gcroes, bburns
Subject: Workstation for Mark Swain
Date: Sat, 14 Dec 91 14:22:56 -0500

When I talked with Bob (Burns) about this topic last week I was somewhat surprised to hear that Geoff had not mentioned it to him based on our earlier conversation. I am presuming that this was just an oversight on Geoff's part, as the time frame is (just) "post-aips++-deluge", but this will put in writing what I had requested earlier from Geoff, just for the record.

Mark Swain is a Ph.D. student presently at the University of Rochester. In June or July of 1992, exact date still to be determined, he will be joining the NRAO Ph.D. student program to work under my direction on the research part of his Ph.D. (I think his official title while at NRAO will be Junior Research Associate or something like that). He will be working on a project that will involve the reduction of some very large VLA continuum data sets (wide-field imaging of multi-configuration data). In the past, I have done similar projects on the Convex C-1, where I experience at best 24-hour real time performance on individual iteration steps in the self-calibration, and several days of real time for a typical image deconvolution, when running as the only major AIPS user in the C-1. Thus, under ideal conditions with no other major user, the calibration of a single VLA configuration for this sort of work takes about a week of real time, and imaging at least another week. Mark's project will involve many such self-calibrations (with typically 5 to six such iterations per calibration), and the construction of tens of images that will require such deconvolutions. We are therefore looking at reductions that would take several months of C-1 real-time even in the absence of other major users of that machine.

Mark will also need access to a personal workstation for the general computing that will be required for his thesis.

This is therefore to formalize my earlier request that he be assigned one of the enhanced-disk SPARC-2 stations from the Charlottesville workstation complement when he arrives. On the assumption that this workstation complement will only barely cover the CV staff needs, I will balance this request for a SPARC-2 for Mark by not requesting a UNIX workstation at this stage for myself. I will instead continue using a PC-386 as at present for my personal and observatory work. I will, however, expect to do some of my own AIPS data reduction on the SPARC-2 that I am requesting for Mark, and to take this workstation over for my own use when his Ph.D. thesis is completed in 1994.

Please let me know if any clarification is needed.

Alan B.

From: abridle (Alan Bridle)
To: ghunt
Subject: Copy FYI re M. Swain arrival
Date: Tue, 7 Jan 92 18:13:58 -0500

----- Start of forwarded message -----

X-VM-v5-Data: ([nil nil nil nil nil nil t nil nil]
["193" "Mon" "23" "December" "91" "16:41:47" "-0500" "Alan Bridle" "abridle "
nil "5" "M.Swain arrival data" "^From:" nil nil "12"]])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA26232; Mon, 23 Dec 91 16:41:47 -0500
Message-Id: <9112232141.AA26232@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: gcroes, rburns
Subject: M.Swain arrival data
Date: Mon, 23 Dec 91 16:41:47 -0500

I have just talked with my student, Mark Swain, to determine his arrival date in C'ville next summer. We have settled on July 1. This is for your records re his workstation assignment.

Alan

----- End of forwarded message -----

From: abridle (Alan Bridle)
To: SWAI@db1.cc.rochester.edu
Subject: Proposal
Date: Wed, 22 Jan 92 15:28:24 -0500

I have the reproductions from the slide now. They look very good indeed and Figure 1 of the proposal will therefore be in great shape.

I have also just received from the VLA archive a copy of the tape with the 6cm A configuration data that had gone missing from Stefi's collection. This should permit imaging of the whole structure at 0.4" resolution when it is calibrated and combined with the existing 6cm data. That will be one of the first big data-processing steps for you! This merging will probably be best done after you are here in July. (It will probably best for you only to try your hand at image deconvolution and combination until we have had the chance to spend some time together on the primary calibration and image-formation techniques.)

I'm involved in meetings for most of the rest of the week but I'll keep my eye open meanwhile for your comments in the proposal draft. I'll plan to work on the proposal properly next Monday, after these meetings are over. So send me an E-mail any time that you can fit it in before or during the weekend.

Alan

From: abridle (Alan Bridle)
To: SWAI@db1.cc.rochester.edu
Subject: Re: proposal
Date: Wed, 22 Jan 92 15:52:08 -0500

That's where the "Synthesis Imaging" book will be indispensable for you. What I do have is a Lotus 1-2-3 spreadsheet that I developed to organize and automate many of the calculations that are needed for planning VLA observing. That's one thing I could send you over the net or on a diskette if you'd like to kick the process around a bit on a PC.

Basically, for the D array we are doing only a short observation, so the HA affects two things: 1) whether we can get to the master flux density and polarization calibrator (3C286) well above the horizon and 2) how the configuration of baselines is foreshortened by projection towards 3C353. I want -4h to optimize our look at the calibrator and to foreshorten the baselines enough to sample the large-scale structure of 3C353 better. For the more widely separated arrays, we're doing long enough observations that the baselines among the arms will have time to fully rotate across each other and thus "close the coverage up" (at least as well as one can for a source close to the equator). In this case the precise HRange is less important. For the B and A arrays we're asking for 10h, which is pretty much the full length of time that 3C353 itself is above the horizon (I will spell that out in the next draft so that the referees appreciate where the 10h has come from!).

The reason for needing much more time in the extended arrays is of course to preserve sensitivity to resolved structure (the ideal would be to reach the same surface brightness sensitivity in all configurations but this is not do-able in practice at the highest resolutions because the observing times would become enormous). 30-min, 4-h, 10-h is taken as a bit of a compromise between the needs of filling up the baseline-sampling domain (the u,v plane in the usual notation), of getting a reasonably matched surface brightness sensitivity, and of not having observations that are either ridiculously short or ridiculously long. The former may "get lost" if we have any kind of system problem, and the latter simply won't get scheduled through the refereeing system!

Cheers, A.

From: abridle (Alan Bridle)
To: SWAI@db1.cc.rochester.edu
Subject: spreadsheets
Date: Fri, 24 Jan 92 15:09:55 -0500

I just put some software and docs into the first-class mail for you.

On one 720k 3.5 inch diskette, the two spreadsheets that I have used for VLA observation planning, VLAPLAN3 and VLAUVPL, with a couple of doc files (README and PLANDOCS.TXT).

On another, a copy of my old (1986) Lotus 1-2-3 V2.0. Sounds like your copy is Version 1A, and these won't run with that. I've stopped using my 2.0 so I guess it's only mildly illegal for you to have a copy of it. Don't pass it around to anyone else, but it seems silly for you not to take a look at these calculations because your Lotus is out-of-date when I have an obsolete 6-year old copy that will run them!

I'm also sending you in the same package (a) a printout of the last "published" (NRAO memo series) doc on these spreadsheets, and (b) a copy of the lecture from the "Synthesis Imaging" workshop whose content they are meant to encapsulate. The lecture is not stand-alone, though, it draws heavily on the contents of earlier ones in the series so you may still have to wait until you have a copy of the whole book for parts of it to make much sense. But in case this much is helpful to you, it may be a start

The program documentation talks about an "NRAO distribution diskette" for the spreadsheets. This isn't what I've sent you. To simplify matters, I've just sent you the .WK1 files, which you can simply read straight into Lotus. So skip the unpacking and "installation" instructions and go directly to running the spreadsheets as you would any others.

These materials are not, of course, the ideal introduction to VLA proposal design, but rather a toolkit for people who know the basics already. Still, they may serve to show you what the issues are, and the spreadsheets may give you something to kick the problem around with once you do get a copy of "Synthesis Imaging" and get a chance to look at a full exposition of the problems. If it's very inefficient and time-consuming, it can all wait 'til you're here. We'll either have some more proposals of your own for you to organize, or you can rough some out for another project to be sure you have thought the problems through!

Cheers, Alan

From: abridle (Alan Bridle)
To: SWAI@db1.cc.rochester.edu, sbaum@stsci.bitnet
Subject: Next draft of 3C353 proposal
Date: Tue, 28 Jan 92 15:47:03 -0500

I've munged some more on text for the 3C353 VLA 8-GHz proposal, and here's the present draft. (Mark has seen an earlier version, this is first version for Stefi).

If you have time, take a look at it and give me any comments. It has to be submitted by the end of the week. The photos for Fig.1 are done.

Stefi - how about a "proper" optical followup, rather than the borrowed time we've had so far? There was a hint of emission lines near the jet in the older data, plus the obvious question about the cold spot region. What might be the best instrument to go for to pull out fainter line emission than was found in your thesis? It's also notable that the "little disk" of emission in 353 was approximately perpendicular to the jet. Any way we could go after that spectroscopically, e.g. to see if it is rotating? Would need good angular resolution.

Cheers, Alan

From: abridle (Alan Bridle)
To: SWAI@db1.cc.rochester.edu, sbaum@stsci.bitnet
Subject: Sent last message without this!
Date: Tue, 28 Jan 92 15:48:04 -0500

=====text follows=====

8-GHz imaging of the radio galaxy 3C353

Mark Swain (U.Rochester)
Alan Bridle (NRAO-CV), Stefi Baum (STScI)

We wish to image the radio galaxy 3C353 at up to 0.65" resolution using the VLA B,C and D configurations at X Band. These data will complement existing L, C and U Band syntheses (VLA proposals AB352 and AB389) for continuum spectroscopy and polarimetry at constant angular resolution (about 1.2"). We also ask for the A configuration at X Band to examine the internal structures of the jets, hot spots and filaments at up to 0.22" resolution. These new observations, and the analysis of the entire multi-frequency database, will be a major part of Mark Swain's Ph.D. thesis.

3C353, a 15.4-magn E galaxy in a Zwicky cluster at $z = 0.0304$, is a wide-lobed double radio source about 120 kpc in extent ($H = 100$) and emitting about a hundredth the radio power of Cygnus A. Although 3C353 is the fourth brightest radio galaxy in the 3C Catalogue (57 Jy at 1.4 GHz), it was under-studied at radio wavelengths until recently because its -0.90 declination and 19.60 galactic latitude eliminated it from "standard" complete samples that were defined for work with East-West interferometers during the 1960s and 1970s. VLA proposals AB352 and AB389 began to rectify this neglect with multi-configuration syntheses at 1.2" resolution at 1.38, 1.67, 4.9 and 14.5 GHz, and additional data at 22 GHz in the D array and at 4.8 and 14.5 GHz in the A array. These data show (Bridle and Williamson 1990) that 3C353 has an unusually rich internal structure (Figure 1), dominated by a complex of large-scale filaments. These filaments have the following properties:

- (a) they are typically tens of kpc long and a kiloparsec across,
- (b) they are highly (50% to 75%) linearly polarized and
- (c) they have high emissivity contrast (10x to 30x enhancement) with other lobe emission,
- (d) their 1.4-14 GHz continuum spectra are not identical either to one another or the other lobe emission, some filaments having flatter and others steeper than the average for the lobe.

There are also apparently "dark" filaments. Some obvious examples (e.g. in the north part of the east lobe) clearly adjoin bright filaments. This suggests filament pairing, with regions between members of a pair appearing dark by contrast (Such "pairs" may thus be describable as edge-brightened "ribbons"). Not all dark features in 3C353 fit this description, however. The relationship between apparently bright and apparently dark filaments could be clarified by continuum spectroscopy and polarimetry at fixed resolution, and by imaging with good sensitivity at higher resolution. One clear "anomaly" is the prominent, round, "cold spot" in the East lobe, which has about the same FWHM (4" - 1.7 kpc if at the distance of 3C353) and fractional depth (about one-half of the surrounding emission) at all frequencies from 1.38 to 14.5 GHz. This "cold spot" is not clearly an

interstice that is defined by the surrounding bright features. It is hard to explain by any isotropic thermal (free-electron) or nonthermal (relativistic-electron) absorption or scattering mechanism, as there is no foreground galaxy to provide the material for the absorber. It might be a purely "geometrical" effect (an accidentally aligned "tunnel" through the filament complex) or a cylindrical high-field region from which particles have been excluded. Alternatively, if the apparently dark and light filaments reflect anisotropic emission by particles streaming along well-ordered fields, the "cold spot" might be a filled but well-aligned "dark" filament.

Models of such filamentation in radio galaxies range from cooling instabilities to field amplification at loci of high shear (which have been found to develop filamentary forms in recent 3-d MHD models by Clarke and Norman (1992)). The detailed distributions of spectral index, spectral curvature and Faraday-corrected polarization across the filament complex can provide new constraints for such models. Imaging with good sensitivity at high angular resolution should also separate individual filaments better, and determine the internal brightness profiles of resolved filaments, of which there are several.

The jet, counterjet and hot spots are all resolving at 1.2" FWHM, and exhibit much internal structure, including misaligned knots and limb-brightening in the jets, and "streamers" emanating from the hot spots. The Faraday RM varies smoothly across the West (counterjet) lobe but in the East (jetted) lobe it has significant substructure near the hot spot and in long filaments that cross the intensity features. At these RM filaments and in a few compact knots there is significant low-frequency depolarization, but these structures are not well-resolved at 1.2" FWHM.

M. Swain's Ph.D. thesis will therefore examine the distributions of spectral index, spectral curvature, rotation measure, depolarization, and magnetic field in the lobes, filaments, hot spots and jets of 3C353, for comparison with those of the other bright radio galaxies that have been imaged in comparable detail -- Cyg A, Fornax A and M87. This study needs a full 8-GHz data set for 3C353 for several reasons. First, the 14.5 GHz data which now "anchor" the upper end of the spectrum for the fainter extended features (only the brightest substructure is detected at 22 GHz), are limited in accuracy by: (a) relatively poor sensitivity, (b) imprecision in the mosaicing of the whole source by uncertainties in the correction for the VLA primary beam at 14.5 GHz, and (c) the inability of the D array to sample all of the large-scale structure properly at 14.5 GHz. These limitations could be all removed by 8-GHz data that would (a) be more sensitive, (b) have smaller primary-beam corrections and (c) sample the largest scales better. For example, the complex of transverse filaments in the inner part of the West lobe appears to have a flatter spectrum than the rest of the lobe between 4.9 and 14.5 GHz, similar to that of the hot spots. This spectral flattening is not expected in diffusive models of particle transport in the lobes, but might be understood if the filaments have curved spectra and contain enhanced magnetic fields. Precise spectral imaging of 3C353 may therefore be able to constrain models of filament formation and of particle transport in the lobes, but our 14.5 GHz data are of marginal quality for this.

High signal to noise is needed to define the high-frequency spectra of the filaments, jet and counterjet better. High angular resolution is needed to display their internal intensity and magnetic structures and

to elucidate the question of possible filament "pairing". The following 8-GHz observations would provide definitive high-frequency imaging:

D array: 30 min at about -4h HA to sample the short spacings and observe 3C286 to calibrate polarization p.a. We ask to co-ordinate this with another observer's 8- GHz run to determine the on-axis instrumental polarization properties.

C array: 4 hrs to provide intermediate baselines for the whole-source synthesis.

B array: 10 hrs to provide long baselines for a whole-source synthesis at up to 0.67" resolution. These data would be tapered to 1.2" resolution for spectral curvature analysis at 1.4, 1.7, 4.9, 8.4 and 14.5 GHz, and used directly with the 4.9 GHz data for limited spectral and RM imaging of fine structure at 0.67" FWHM.

A array: 10 hrs to image the brightest fine structure in the hot spots, jets and filaments at 0.22" (80 pc) resolution.

Figure 1: glossy print of the L_{band} composite intensity image (looks very nice!)

References: to be added

=====
=====end of text=====

From: abridle (Alan Bridle)
To: rbrown
Subject: Mark Swain's address
Date: Fri, 31 Jan 92 14:07:23 -0500

is:

Department of Physics & Astronomy
University of Rochester
Rochester
NY 14627-0011

From: SWAI@db1.cc.rochester.edu
To: abridle@polaris.cv.nrao.edu
Subject: Re: How's it going?
Date: Mon, 6 Apr 1992 16:55 EST

We got the SUN finally; I have yet to install AIPS on it. I have been trying to estimate the flux from FeIVX in the lobes. The FeIVX line is at 530.3 nm; numbers for that transition are HARD to find. I'm still chasing numbers for the collision strength and relative abundance of FeIVX to Fe at 10^6 deg. Just today, I got some references from a solar astronomer at NOAO (or something like that). We'll see if they pan out.

I presented the Perly et al. paper on the spectral aging of the lobes of Cygnus A and learned a lot. I guess there is no chance we could perform such an analysis on 3C353; it looked like they had LOTS of observations. I think they had 15 different frequencies for their 4.5 arc sec resolution images. With the rich structure exhibited in 3C 353 we might find that the spectral aging contours are not as uniform. It would be interesting to see if the break frequency of the filaments is different from that of the lobes or if the injection indices match.

It's ironic that you sent me a message when you did. I sent a message to you Friday March 27. I must have made a mistake in the address because today I found lots of "undelivered mail" messages from mailer demons. It turns out that I was in Charlottesville Tues->Fri of last week. I wanted to drop by to chat and do some free copying of thesis related materials. Since I didn't get a reply from you, I assumed you were out of town, not that I had made a mistake with the email address. (I have a script set up so that I type your name and it automatically fills in your address - this has worked just fine in the past) I intended to try to telephone you while I was in C'ville but I was swamped with the closing on our house. In addition to the closing, I gutted the basement apartment clear down to the stud walls - this included removing the ceiling. Sorry we missed each other.

Melanie was accepted by UVA and decided to transfer. It will certainly make me happier to have her in Charlottesville than in Rochester for the summer and fall semester (the summer and fall semester are when she would have stayed in Rochester to finish class work).

I start work on a presentation soon for my astrophysical MHD class soon. Naturally, it will be on MHD models for jets. Jets have been completely neglected in our course. Currently I know how to write down the induction equation and a few other equations and solve them for a few, simple, contrived systems. Hopefully I'll learn a little about how to apply them to jets. Got any favorite papers to suggest?

Grading and homework continue as usual.

Mark

From: abridle (Alan Bridle)
To: SWAI@db1.cc.rochester.edu
Subject: Re: How's it going?
Date: Tue, 7 Apr 92 17:25:02 -0400

Hi there Mark,

Thanks for your message. Sorry we missed while you were here, but I can see you've been pretty busy. Glad to hear that Melanie was accepted at U.Va., that simplifies matters for you a whole lot!

We will not be able to do as extensive an analysis on 3C353 as was done for Cygnus, but we will still have 5 pretty good frequencies with which to look at spectral ageing. The huge number of frequencies for Cygnus was needed really because of the high rotation measures, and they were trying to constrain the RM amplitude by having many frequencies per band. We know that for 353 the RM's are much more normal (except for a few small regions in which we may have to be careful to look for possible ambiguities in the data that we do have). For spectral purposes, the close frequencies tell you very little, and our coverage will be about the same as the Cygnus coverage for most purposes.

There's not a lot out there on MHD models for jets that isn't covered in Jean Eilek's chapter in The Book.

As for thermal electron densities, we don't have direct constraints from the radio data for lobes in radio galaxies (you'd really need to detect the internal depolarization for that, though the absence of such will give upper limits). What we do know is estimates of the ambient density from X-ray continuum observations of clusters -- you could take a standard cluster and a cooling flow as two cases. But the question of how much of the ambient gets into the lobes by entrainment across the boundary is very controversial. In an extreme case, it could be zero.

The Cyg A case as described by Perley et al. is probably close to an upper limit for most radio galaxies, as it's a strong colling flow with very high RM's. We don't of course know how much of that stuff is really inside the radio emitting region but the ambient is pretty well taken care of there. The only other case that's as well studied is Virgo A (M87).

I'll be hard to get hold of in about 3-4 weeks' time. We're selling our house and moving so chaos will reign for a while. I'll try to check E-mail while confusion reigns but may be particularly out of it for the first week of May!

From: SWAI@db1.cc.rochester.edu
To: abridle@polaris.cv.nrao.edu
Subject: salary
Date: Mon, 4 May 1992 12:29 EDT

Alan,

Hugh and Dan need to know how Rochester makes it's monthly contribution to my salary. Maybe something official needs to be sent to the U of R physics dept.

I am moving to C'ville May 19 or 20. My C'ville phone number is 295-0294. I'll give you a call something during the last week of May. I will not be able to read mail email on at my Rochester account after May 15.

What is the status on our proposal?

I can't wait to get to started! :)

From: SWAI@db1.cc.rochester.edu
To: abridle@polaris.cv.nrao.edu
Subject: Re: salary
Date: Thu, 14 May 1992 11:46 EDT

I'll be in C'ville starting the 20th. I would like to stop in and get an email account so that I can contact Hugh and Dan about salary details. I got something back from the VLA proposal refs. but I can't figure out wheather we got all our time or not. I'll give you a phone call at NRAO mid to late next week.

From: SWAI@db1.cc.rochester.edu
To: abridle@polaris.cv.nrao.edu
Subject: Re: salary
Date: Thu, 14 May 1992 12:01 EDT

I just talked to Dan and he says that either you or Bob Brown need to send a letter to him and Hugh explaining what is suspose to happen. Dan says without something in writting, no official paper trail can be established on this end. The addresses for Hugh and Dan are the same as mine here. Just in case you need it again:

Dan M. Watson
Assistant Professor of Physics and Astronomy
Department of Physics and Astronomy
University of Rochester
Rochester, NY 14627-0011

Hugh Van Horn
Professor.....
same as for Dan

The last day I will check my email here is tomarrow.

From: rbrown (Robert Brown)
To: abridle (Alan Bridle)
Subject: Re: M.Swain salary U.R. component
Date: Fri, 15 May 92 08:34:58 -0400

U.R. should pay him directly, ignoring the fact that we are also paying him, and certainly should not hand us money that we pass along to Mark. The idea of this rather token university commitment is to remind the university that they still have a financial as well as an academic attachment to the student.

From: abridle (Alan Bridle)
To: rbrown
Subject: Office space
Date: Wed, 3 Jun 92 14:35:31 -0400

Mark Swain starts his 2 years at NRAO on July 1 (he is already here in C'ville but you may recall we told him not to start until July 1 so that we could assign him space and a SPARC station to be vacated by the aips++ group).

I have been trying to make arrangements with Bob Burns about which computer desk and SPARCs will be assigned to Mark, and when, to ensure that we do have something ready to go for him when he starts.

Question is :-- which **room** does he go into according the NRAO post-aips++, post VLBA correlator master room plan?

Thanks, A.

From: abridle (Alan Bridle)
To: SWAI@db1.cc.rochester.edu
Subject: Experiments
Date: Thu, 16 Jul 92 18:47:27 -0400

I tried several after you went to dinner.

1. I was able to crossmount your data disk and lemur's from an aips login on my own machine. So I copied the CLEANed A array image and its .CC file across to lemur's disk under control of my machine, using the AIPS SUBIM task. This got the 1000-points-of-light model onto lemur's disk alongside the B array data.
2. I ran the CALIB of the B array data on the A array model, on lemur. Also avoiding the network scratch disk. Much faster. But of course the cpu is much faster, too.
3. I found out how to run a monitor of truchas' cpu performance on my machine, so I could watch the CPU load of the MX from my machine. There are long periods of about 60% cpu load followed by short bursts of almost 100% and idle. Friday morning, let's try to get this going in your window system so we can learn a bit more about the load factors.

Cheers, Alan

From: abridle (Alan Bridle)
To: mswain
Subject: 3C353 image
Date: Sat, 18 Jul 92 15:37:02 -0400

I came in this pm and looked at the 3C353 A+B deconvolution. It's in good shape and we are going to have a spectacular view of the filaments once we also mix the C and D data in!

As sometimes happens with a combined-array dataset, the CLEAN went negative well before the # of components in the previous A-only deconvolution. So we need to keep going with CALIB on the combined data. I set a CALIB going on truchas as this is where we have both the uv data and the image+CC available. Should be done some time this evening.

If it runs to completion o.k., you might try rerunning the MX.

Call me at home, 971-7752 if there are any problems.

Alan

From: mswain (Mark Swain)
To: abridle
Subject: VLA archive request
Date: Thu, 29 Oct 92 14:49:21 -0500

Alan,

Here is the message I sent to Sue requesting a copy of the archive tape for the C band, D array data.

```
----- Start of forwarded message -----  
X-VM-v5-Data: ([nil t nil nil nil nil nil nil nil]  
  ["1637" "Wed" "28" "October" "92" "14:43:35" "-0500" "Mark Swain" "mswain " nil  
  "45" "Re: archive copies" nil nil nil "10"])  
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)  
  id AA39048; Wed, 28 Oct 92 14:43:35 -0500  
Message-Id: <9210281943.AA39048@polaris.cv.nrao.edu>  
References: <9210011551.AA12217@zia.aoc.nrao.edu>  
From: mswain (Mark Swain)  
To: Data Analysts <analysts@aoc.nrao.edu>  
Subject: Re: archive copies  
Date: Wed, 28 Oct 92 14:43:35 -0500
```

Sue,

During the course of my request for copies of the VLA archive tapes for project codes AV112, AM270 and AB354, you sent me an email message to the affect that the observation date I requested for AV112 (28-SEP-84) was incorrect and that the AV112 observations occurred on 29-JUL-84. I apologize for not looking into this matter more carefully at the time. Unfortunately, the AV112 data I was sent does not include any observations of the source I am interested in (1717-009). After some detective work on this end, it now appears that I gave you the wrong project code.

Here is what happened. Alan Bridle, my thesis advisor, gave me calibrated data (C band, D array for 1717-00) which was originally observed by Wil Van Breugel on 28-SEP-84 between 22 48 and 23 18 IAT. Alan and I now wish to refer to the uncalibrated data from the same observations. Unfortunately, Alan no longer has the uncalibrated data. For a variety of reasons, we mistakenly concluded that the observations we were interested in were done under project code AV112. We now have good reason to believe the correct project code is AV91.

So, I need a copy of the VLA archive tape for the following source and any calibrators associated with it.

```
source = 1717-00          <- This information we  
observer = Van Breugel   <- know is correct from  
observe date = 28-SEP-84 <- the calibrated data  
IAT range = 22 48 to 23 18 <- we already have.  
  
project code = AV91      <- information we believe  
                        to be correct
```


My address is:
Mark Swain
NRAO
520 Edgemong Road
Charlottesville, VA 22903-2475

Thanks,
Mark

----- End of forwarded message -----

From: mswain (Mark Swain)
To: abridle
Subject: approved IPAC user/ADDSCAN request
Date: Thu, 29 Oct 92 14:44:14 -0500

Alan,

To submit an ADDSCAN request to IPAC, you must first become an approved IPAC user. Ann Wehrle suggests that you write and email letter addressed to the director (of IPAC?) Charles Beichman explaining the project and requesting to become an approved IPAC user. Ann also specified that the letter be sent to her address.

aew@ipac.caltech.edu

An ADDSCAN request needs to be submitted although whether this should be done concurrently with requesting to become an approved user or not is not clear to me. I included the message/instructions I got from the addscan-req account in this message and I filled out the ADDSCAN request form so it should be ready to submit when ever you feel is appropriate.

Mark

- ----- Start of forwarded message -----
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
["8322" "Tue" "27" "October" "92" "08:25:03" "PST" "ADDSCAN-
REQ@ipac.caltech.edu" "ADDSCAN-REQ@ipac.caltech.edu" nil "174" "ADDSCAN Information
per your request" "^From:" nil nil "10"])
Received: from ipac.caltech.edu by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA42241; Tue, 27 Oct 92 12:25:22 -0400
Return-Path: <ADDSCAN-REQ@ipac.caltech.edu>
Received: by castor.ipac.caltech.edu (4.1-ir.030292)
id AA08801; Tue, 27 Oct 92 08:25:03 PST
Message-Id: <9210271625.AA08801@castor.ipac.caltech.edu>
Comments: This reply is computer generated
Version: Thu Apr 9 13:55:53 PDT 1992
Errors-To: postmaster@ipac.caltech.edu
From: ADDSCAN-REQ@ipac.caltech.edu
Apparently-To: mswain@polaris.cv.nrao.edu
Subject: ADDSCAN Information per your request
Date: Tue, 27 Oct 92 08:25:03 PST

Greetings:

IMPORTANT:

Please be aware that IPAC is in the process of transferring our operations to a new computer environment. This may result in delays in producing some IPAC data products. In particular, delays of up to a month or more are anticipated for ADDSCAN, HIRES and FRESCO requests. Your request will be entered into the queue and will be processed as soon as we are able.

We ask for your patience during this transition period. If you have any

questions, please contact one of the GI Support Staff listed below.

This message is a response to your inquiry on submitting a data request via Electronic mail. Your request should be in the format of the attached template; requests not in this format may be returned for clarification. Because this format is periodically updated, you should send mail to this account each time you make a request.

General Instructions:

The lines on the form that start with '\char' are keyword lines. You must fill out the first five of these (name and address information) but the others will default to the values shown. Lines that start with '\' are comments. The data table header lines start with '|' and the columns are delineated with the '|'. The data in the table must be underneath or to the right of the '|' delineating the left side of the column, and to the left of the '|' delineating the right side of the column. The end of the data table is indicated by '\ EOF'.

Coordinates may be specified in any of several coordinate systems. Epoch 1950 coordinates are assumed. The example shows equatorial sexagesimal coordinates, denoted by CRA and CDEC in the header. The following formats for sexagesimal input are all valid: 1h23m45.6s, 12345.6, 01 23 45.6. Other coordinate systems are available: equatorial decimal (edit the header to read RA and DEC) ecliptic (ELAT,ELON) or galactic (GLAT,GLON).

If you need modification of the processing not accommodated by the keywords in the form, or you have other special instructions, please use the SIC (Special Instruction) lines to state your request.

When you have completed the request form, mail it back to:

INTERNET addscan@IPAC.caltech.edu

If you do not have Internet access, you may try:

NSI/Decnet east::"addscan@IPAC.caltech.edu"

BITNET addscan%IPAC@hamlet

IMPORTANT: When your request has been received, you will be e-mailed an acknowledgement. If you do NOT hear from us, your request may never have reached IPAC. If this happens, please contact the IPAC librarian.

If you would like your results express mailed, please contact the IPAC librarian with an account to charge.

If you do not have a copy of the IPAC User's guide and would like one, or if you would like to be added to the IPAC mailing list please contact the IPAC librarian. Other documentation you may find useful includes the IRAS Catalogs and Atlases Explanatory Supplement and the Faint Source Survey Explanatory Supplement.

Note that the people below may be e-mailed in any of the address formats detailed above for returning your data request. Simply replace ADDSCAN with username. For general questions about IPAC send mail to username "info". For questions about your usage of the IRAS data please contact the GI Support staff.

Name (username)			
Rosanne Scholey	(library)	Library & Facilities Supervisor	(818)584-2960
Deborah Levine	(deblev)	GI Support Specialist	(818)584-2913
Ann Wehrle	(aew)	GI Support Scientist	(818)584-2923

About ADDSCAN:

If you are scheduled to come to IPAC to perform further analysis requiring that the ADDSCAN or SCANPI output files be on-line during your visit, please specify this in the SIC area.

ADDSCAN tape output defaults to 6250bpi density, ANSI-standard unlabelled format with a logical record length of 132 bytes and a block size of 19008 bytes. All individual disk files are written separately to tape. If you wish any variation to this, please specify your constraints in the SIC fields or call us.

More information about ADDSCAN/SCANPI is available in the IPAC User's Guide (Dec 1989 version).

```

- - ----- request form starts below this line -----
\
\          ADDSCAN Processing Request
\          =====
\
\  User Information
\  -----
\char PI      = "Funded One "          ! (20 characters max.)
\char NAME    = "Alan Bridle "        ! (if other than PI)
\char INST    = "NRAO"
\char ADDRESS = "NRAO, 520 Edgemont Rd. Charlottesville, VA 22903-2475"
\char PHONE   = "804-296-0375"
\
\          Note:  The PI should be the name of the
\          ===== Principal Investigator.  The PI must
\          either have and ADP grant or must be an
\          approved user.  If the PI is the one
\          making the data request, NAME may be
\          left blank.
\          The institution, mailing and phone
\          data are required.
\
\char USERID = " "          ! IPAC USE ONLY
\char NEED_BY = "1/1/93"
\
\char MAIL = yes          The output will be mailed to you rather than
\                          waiting at IPAC for you to come and get it
\                          (mailed output is deleted at IPAC unless
\                          otherwise specified in the SIC fields).
\                          Set MAIL = ftp if you wish to pick up your
\                          data from our anonymous ftp account.  However,
\                          plots cannot be obtained this way, only data
\                          that would have been written to tape.
\
\  DEFAULT PROCESSING:    Run ADDSCAN and SCANPI
\  -----              (SCANPI run on coadded data only).

```

```

\                                     Print SCANPI summary tables on paper only.
\                                     Generate SCANPI plots.
\
\ Modified Processing
\ -----
\char SCANPI   = yes           ! Change to 'no' if you don't want SCANPI run.
\char ADDPLT   = no           ! Use ADDPLT to plot raw data for each scan
\                                     ! and to plot coadded raw data.
\char NOPT     = no           ! SCANPI processing done on each detector pass.
\
\
\ Output
\ -----
\int  DENSITY = 6250          ! Output tape density (1600 / 6250 bpi)
\char ADDTBL   = no           ! Write raw scan data to tape in ASCII format.
\char MEDOUT   = no           ! Write SCANPI median scan profiles to tape.
\char SPIPLT   = yes          ! Generate SCANPI paper plots.
\char SUMOUT   = paper        ! Output disposition of SCANPI summary tables
\                                     ! (paper/tape/both).
\
\
\ Special Instructions           (free format text, three lines max.)
\ -----
\char SIC1 = "                                     "
\char SIC2 = "                                     "
\char SIC3 = "                                     "
\ -----
\
\ Source Table   Coordinates are equatorial (sexagesimal (CRA,CDEC) or
\ -----       decimal degrees (RA,DEC)), galactic (GLON,GLAT), or
\                                     ecliptic (ELON,ELAT). Source name is 16 characters or less.
\ -----
| Source      | RA      | DEC      |
| char        | char    | char     |
| S0001       | 17 17 53.3   -00 55 49.5
\ EOF
- ----- End of forwarded message -----

```

From: abridle (Alan Bridle)
To: mswain
Subject: Draft of letter
Date: Mon, 2 Nov 92 10:37:46 -0500

Dr. C. Beichman,
Director, IPAC,
California Institute of Technology.

Dear Dr. Beichman,

I wish to become an approved IPAC user in order that Mark Swain, a student doing a Ph.D. thesis under my supervision, may have access to the ADDSCAN/SCANPI data for the radio galaxy 3C353.

The ADDSCAN/SCANPI data for 3C353 are needed to set limits to the infrared luminosity of the galaxy, for comparison with published IR data for other powerful radio sources.

3C353 (1717-009) is a powerful, extended double-lobed radio source centered on a giant elliptical galaxy in a cluster at $z=0.0304$. Despite being the fourth brightest radio galaxy in the 3CR, the source has long been understudied at radio wavelengths because of its low declination. Mark Swain and I have observed the source with the VLA, and have found that it contains many interesting radio features, including well-resolved jets and hot spots, and a rich network of large-scale filaments throughout both radio lobes. We are now producing sensitive, high quality VLA images of 3C353 for an intensive multi-frequency study of its spectral and polarimetric properties.

Our ADDSCAN/SCANPI request is being sent by separate E-mail to Ann Wehrle.

Thank you for your consideration in this matter.

Alan H. Bridle

Scientist (Basic Research)
National Radio Astronomy Observatory
520 Edgemont Road, Charlottesville,
VA 22903-2475

From: aew@ipac.caltech.edu
To: abridle@polaris.cv.nrao.edu
Subject: Re: 2 mails coming
Date: Mon, 2 Nov 92 13:48:20 PST

Congratulations, you are now an approved user (userid ipacd44). Probably the easiest proposal you ever wrote? It will take a couple of weeks or so for you to received the output in the mail.

I have crunched several nice bright nearby radio galaxies through the HIRES process to improve resolution with IRAS. None were resolved in any useful manner. If your object is brightere than 1 Jy, we can give it a try.

cheers,
Ann

From: abridle (Alan Bridle)
To: aew@ipac.caltech.edu
Subject: Letter to C. Beichman
Date: Mon, 2 Nov 92 12:59:25 -0500

Dr. C. Beichman,
Director, IPAC,
California Institute of Technology.

Dear Dr. Beichman,

I wish to become an approved IPAC user in order that Mark Swain, a student doing a Ph.D. thesis under my supervision, may have access to the ADDSCAN/SCANPI data for the radio galaxy 3C353.

The ADDSCAN/SCANPI data for 3C353 are needed to set limits to the infrared luminosity of the galaxy, for comparison with published IR data for other powerful radio sources.

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Our ADDSCAN/SCANPI request is being sent by separate E-mail to Ann Wehrle.

Thank you for your consideration in this matter.

Alan H. Bridle

Scientist (Basic Research)
National Radio Astronomy Observatory
520 Edgemont Road, Charlottesville,
VA 22903-2475

From abridle Mon Nov 2 13:04:28 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
["3571" "Mon" "2" "November" "92" "13:04:23" "-0500" "Alan Bridle" "abridle "
nil "78" "ADDSCAN request" nil nil nil "11" nil nil (number " " mark " Alan
Bridle Nov 2 78/3571 " thread-indent "\"ADDSCAN request\""\n") nil]
nil)
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA18480; Mon, 2 Nov 92 13:04:23 -0500
Message-Id: <9211021804.AA18480@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: aew@ipac.caltech.edu
Subject: ADDSCAN request
Date: Mon, 2 Nov 92 13:04:23 -0500

```
\
\
\          ADDSCAN Processing Request
\          =====
\
\  User Information
\  -----
\char PI      = "Alan H. Bridle"                ! (20 characters max.)
\char NAME    = " "                            ! (if other than PI)
\char INST    = "NRAO"
\char ADDRESS = "NRAO, 520 Edgemont Rd. Charlottesville, VA 22903-2475"
\char PHONE   = "804-296-0375"
\
\          Note:  The PI should be the name of the
\          ===== Principal Investigator.  The PI must
\          either have and ADP grant or must be an
\          approved user.  If the PI is the one
\          making the data request, NAME may be
\          left blank.
\          The institution, mailing and phone
\          data are required.
\
\char USERID = " "                            ! IPAC USE ONLY
\char NEED_BY = "1/1/93"
\
\char MAIL = yes                               The output will be mailed to you rather than
\                                               waiting at IPAC for you to come and get it
\                                               (mailed output is deleted at IPAC unless
\                                               otherwise specified in the SIC fields).
\                                               Set MAIL = ftp if you wish to pick up your
\                                               data from our anonymous ftp account.  However,
\                                               plots cannot be obtained this way, only data
\                                               that would have been written to tape.
\
\  DEFAULT PROCESSING:                         Run ADDSCAN and SCANPI
\  -----                                     (SCANPI run on coadded data only).
\                                               Print SCANPI summary tables on paper only.
\                                               Generate SCANPI plots.
\
\  Modified Processing
\  -----
\char SCANPI  = yes                            ! Change to 'no' if you don't want SCANPI run.
\char ADDPLT  = no                             ! Use ADDPLT to plot raw data for each scan
\                                               ! and to plot coadded raw data.
\char NOPT    = no                             ! SCANPI processing done on each detector pass.
```

```

\
\
\ Output
\ -----
\int DENSITY = 6250          ! Output tape density (1600 / 6250 bpi)
\char ADDTBL = no           ! Write raw scan data to tape in ASCII format.
\char MEDOUT = no           ! Write SCANPI median scan profiles to tape.
\char SPIPLT = yes          ! Generate SCANPI paper plots.
\char SUMOUT = paper        ! Output disposition of SCANPI summary tables
\                             ! (paper/tape/both).
\
\
\ Special Instructions      (free format text, three lines max.)
\ -----
\
\char SIC1 = "              "
\char SIC2 = "              "
\char SIC3 = "              "
\ -----
\
\
\ Source Table      Coordinates are equatorial (sexagesimal (CRA,CDEC) or
\ -----          decimal degrees (RA,DEC)), galactic (GLON,GLAT), or
\                  ecliptic (ELON,ELAT). Source name is 16 characters or less.
\
\ -----
| Source   | RA      | DEC     |
| char    | char    | char    |
| S0001   | 17 17 53.3  -00 55 49.5
\ EOF

```

From: mswain (Mark Swain)
To: HVMH%UORDB2.bitnet@CUNYVM.CUNY.EDU, abridle
Subject: Re: qualifying exam
Date: Fri, 6 Nov 92 15:25:49 -0500

Dear Hugh,

Alan and I feel that I should not attempt to take the qual this semester. My intent, considered rather optimistic by Alan, was to squeeze the qual in during the second week of December. That is no longer possible. Alan just heard that a visiting student who was suppose to arrive next week will instead be arriving around Thanksgiving. Neither of us think doing the qual before Thanksgiving is possible and Alan will be busy with his visitor until early '93. Alan also has a strong preference for not traveling to Rochester in January or February because he would rather not risk driving in heavy snow; flying is not an option for him. Postponing the qual until spring also gives me a chance to make a much better proposal for thesis. I apologize for the delay since I know you and Dan are anxious for me to pass the qual as soon as possible.

Thoughts, concerns or screams of indignation?

Regards,
Mark

From: mswain (Mark Swain)
To: aew@ipac.caltech.edu, abridle
Subject: Re: 3c353
Date: Sun, 8 Nov 92 13:41:12 -0500

Dear Ann,

Thank you for helping Alan and I with the ADDSCAN request and with getting the results so quickly. After looking at the ADDSCAN results, it appears that there may have been detections at about the one Jansky level in the 60 and 100 micron band. To be more confident of the detections, I have some follow up questions.

The results of the 60 micron ADDSCAN differ dramatically (a factor of 20) depending on which coadding method was used. In this case, I would like to look at the calibrated data for each individual scan and select by hand which scans should be coadded. Could I get the calibrated data for individual scans by setting the "char ADDPLT" option to "yes" in the ADDSCAN request form and resubmitting our request? The "char ADDPLT" option makes reference to "raw data". Does "raw data" mean uncalibrated individual scan data?

The 100 micron results show a large, broad peak with another peak sitting on top. The peak on top is supposed to be the flux density of 3c353. I would like longer scans to get longer baselines for the fitting algorithm to work with so it can determine whether there are in fact two peaks or just one. Doubling the scan length should do it.

The best way for Alan and I to read individual scan data is from a public access ftp account. I assume there is a way we can do that but I'm unclear about where to specify it in the ADDSCAN request form; would that be a special instruction? I also would appreciate a reminder about what document to read for specific information about how the ADDSCAN and SCANPI algorithms work.

Thanks again for your help and best regards.
Mark

From: mswain (Mark Swain)
To: abridle
Subject: forwarded message from aew@ipac.caltech.edu
Date: Thu, 12 Nov 92 15:26:31 -0500

At Ann's request, I sent her a fax of our ADDSCAN and SCANPI results.
Here is her response.

----- Start of forwarded message -----
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
["1001" "Thu" "12" "November" "92" "12:20:24" "PST" "aew@ipac.caltech.edu"
"aew@ipac.caltech.edu" nil "16" "3c353" "^From:" nil nil "11"])
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA18908; Thu, 12 Nov 92 15:20:27 -0500
Received: from ipac.caltech.edu by cv3.cv.nrao.edu (4.1/DDN-DLB/1.13)
id AA00773; Thu, 12 Nov 92 15:20:30 EST
Return-Path: <aew@ipac.caltech.edu>
Received: from mason.ipac.caltech.edu
by castor.ipac.caltech.edu (5.65-ir.030292)
id AA08092; Thu, 12 Nov 92 12:20:26 -0800
Received: by mason.ipac.caltech.edu (c.090991)
Message-Id: <9211122020.AA08679@mason.ipac.caltech.edu>
From: aew@ipac.caltech.edu
To: mswain@NRAO.EDU
Subject: 3c353
Date: Thu, 12 Nov 92 12:20:24 PST

Okay, I looked at the ISSA plates for your region. This particular plate is not yet released to the public. What you have at 60 microns is the detection of a source which is about 3 arcminutes away from 3c353. In one scan or so, SCANPI is apparently catching enough of the flux from it to confuse the detection, hence, when "discrepant scans" are thrown out for the median filter detection (scan 1002), the big peak visible in the other plots disappears and you are left with a little peak. Unfortunately, this little peak is probably not your galaxy since the region of the sky is filled with filamentary and diffuse cirrus (both). Looking at the 100 micron image makes it pretty clear that this is a nasty region of the sky for extragalactic work. Probably the guys who work on cirrus love it. The 100 micron peak is definitely cirrus.

I can try to make a grayscale version of the image for you at 60 and 100 microns and put it in the mail for you, or you can ftp the postscript file.

Ann

----- End of forwarded message -----

Is there any reason why we need the grayscale version of the 60 and 100 micron images? It sounds like would just be an image of things we are not interested in.

Mark

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: forwarded message from aew@ipac.caltech.edu
Date: Thu, 12 Nov 92 16:55:51 -0500

These images might be of interest in circumscribing future IR follow-ups. If they're going to be made anyway, we might as well have copies of them.

From: abridle (Alan Bridle)
To: mswain
Subject: aips login on rhesus
Date: Tue, 1 Dec 92 16:47:34 -0500

We have fixed the .login script on rhesus so that aips can again be started up from the aips login.

So if you use `rlogin rhesus -l aips`

and respond with the aips password

you will now be able to start aips with, e.g. `aips pr=7 tv=truchas`

If everyone using aips would log in as aips, this will reduce the file-locking problem.

A.

From: abridle (Alan Bridle)
To: mswain
Subject: "Stalled" selfcal
Date: Mon, 7 Dec 92 14:45:26 -0500

I've been working today on a data reduction that illustrates the point about self-cal not really being "stalled" at the first failure to add more CLEAN cpts before the first negative.

Here are the no. of cpts before first -ve, and total CLEANed for a series I did today (each line is a further iteration of selfcal:)

no. cpts	total CLEANed flux density (Jy)
202	0.84
489	0.92
458	0.92
500	0.93
525	0.93
528	0.93
578	0.94
623	0.94
657	0.95
697	0.95
732	0.96

This is a B array dataset on a source with a very strong hot spot and about 450,000 vis records. The sidelobes of the bright hot spot limit the dynamic range and are gradually improving throughout this sequence, despite the stop-and-go behavior of the no. of components before the 1st -ve early on.

This just shows that the search for a better model is not always monotonic in the number of CLEANed cpts before first -ve. It has been more or less monotonic in the before-first- negative CLEANed flux density however. The total flux density of the source is about 1.10 Jy.

If this has been a "big" self-cal job it might have been tempting to call it "stalled" when the number of CLEAN components before first negative first decreased, or again when it only went from 525 to 528. This would not have been correct, though.

I *am* in a regime here where the amplitude and phase corrections are becoming very small (typically less than 0.2% in amplitude and 0.5 degrees of phase) and long-term, so I have been increasing the integration time to get more accurate solutions as the self calibration progresses.

Moral may be that you need to hit your head against the brick wall at least twice before you can be sure the wall is there!

A.

From: abridle (Alan Bridle)
To: mswain
Subject: forwarded message from SBAUM@stsci.edu
Date: Tue, 8 Dec 92 12:06:48 -0500

----- Start of forwarded message -----

Received: from airy.stsci.edu by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA04597; Tue, 8 Dec 92 09:02:02 -0500

Received: from avion.stsci.edu by avion.stsci.edu (PMDF #3144) id
<01GS2FU6THJK8WXP0I@avion.stsci.edu>; Tue, 8 Dec 1992 09:01:31 EDT

Message-Id: <01GS2FU6TR6Q8WXP0I@avion.stsci.edu>

X-Vms-To: BRIDLE

Mime-Version: 1.0

Content-Transfer-Encoding: 7BIT

From: SBAUM@stsci.edu

To: abridle@polaris.cv.nrao.edu

Subject: visit to STScI

Date: 08 Dec 1992 09:01:31 -0400 (EDT)

Hi Alan,

Mark's visits to STScI have been approved and I have 1450.00 to spend on them (with actual expenses not to exceed 90.00 per day). So we should try to set up a time for his visits. I think for me the earliest it would be sensible for him to come would be after the first week in February (I am away in Holland until Jan 17, and then functional responsibilities having to do with the HST archive will consume me until the first week in February...).

How does this sound to you/him?

Stefi

----- End of forwarded message -----

From: mswain (Mark Swain)
To: abridle (Alan Bridle)
Subject: Re: forwarded message from SBAUM@stsci.edu
Date: Tue, 8 Dec 92 12:40:47 -0500

Alan,

Going to STScI after the first week in Feb. if fine with me. It might be a good idea to do STScI right at the first of Feb. and get it done with to eliminate potential schedual conflicts. The VLA will start B configuration observations Feb 12; I am all for finished the STScI stent by that point. Also, when I meet with Hugh and Dan next week, I need to have some idea when we think I might want to take the quall. Does April sound reasonable to you? Naturally, B configuration lasts until Apr 26.

Mark

From: mswain (Mark Swain)
To: abridle (Alan Bridle)
Subject: Re:
Date: Tue, 8 Dec 92 12:47:06 -0500

I found out more about the quall letter. It was sent out by the graduate advisor to almost all graduate students - Dan and Hugh had nothing to do with generating it. Apparently quite a few people were put out of sorts by the letter. Dust still settling and relevance of letter (if any) quite unclear.

From: mswain (Mark Swain)
To: abridle
Subject: VLBA summer school
Date: Mon, 4 Jan 1993 10:29:54 -0500

Alan,

I have some questions regarding a form I have been sent by the VLBA summer school folks. Questions like do I want meal tickets and what air line will I fly on.

After having my truchas disk make very strange noises during power up, I am backing all my aips files. Nothing like a good scare to make one a believer.

Mark

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: VLBA summer school
Date: Mon, 4 Jan 1993 10:34:44 -0500

It's convenient to have lunch at NM Tech during these workshops, as most people will do that for convenience and it's a good time to discuss things and meet people. However, the meals are not particularly good for the price and there are definitely better options for dinner. I don't know about breakfast there as I've usually been in an apartment or a motel during the meetings and so have made my own arrangements.

As for travel, tell 'em when you know your plans! I'll probably be going out and back by train.

A.

From: mswain (Mark Swain)
To: abridle (Alan Bridle)
Subject: Re: VLBA summer school
Date: Mon, 4 Jan 1993 10:51:02 -0500

Is it best that I stay in the dorms?

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: VLBA summer school
Date: Mon, 4 Jan 1993 11:32:27 -0500

It's cheapest, and most of the other students will stay there. I'm not sure it's "best", some of the dorms at Tech are pretty tacky.

From: mswain (Mark Swain)
To: abridle
Subject: qual date/Rochester talk
Date: Mon, 1 Feb 1993 16:07:57 -0500

Alan,

Jack Thomas is the Rochester faculty member in charge of scheduling thier astronomy talks. He would like to schedule you to talk on April 26 (a Monday). I have told him that your schedule is still fluid because of VLBA observing. None-the-less, Jack would at least like to know a date by which you could confirm the talk date. I'll forward you his latest email message.

Mark

From: mswain (Mark Swain)
To: abridle
Subject: forwarded message from "John H. Thomas, University of Rochester"
Date: Mon, 1 Feb 1993 16:11:21 -0500

----- Start of forwarded message -----

X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
["208" "" "01" "February" "1993" "15:43:19" "-0500" "\"John H. Thomas,
University of Rochester\""" "JHTH@db1.cc.rochester.edu" nil "6" "Re: Alan's Astro
talk" "^From:" nil nil "2"]])
Received: from db1.cc.rochester.edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
id AA19863; Mon, 1 Feb 1993 15:42:39 -0500
Received: from DBV by DBV (PMDF #2909) id <01GU7NXYSJF49GVA2Q@DBV>; Mon,
1 Feb 1993 15:43:19 EST
Message-Id: <01GU7NXYVHIQ9GVA2Q@DBV>
X-Envelope-To: mswain@polaris.cv.nrao.EDU
X-Vms-To: IN%"mswain@polaris.cv.nrao.EDU"
X-Vms-Cc: JHTH
Mime-Version: 1.0
Content-Transfer-Encoding: 7BIT
From: "John H. Thomas, University of Rochester" <JHTH@db1.cc.rochester.edu>
To: mswain@polaris.cv.nrao.edu
Subject: Re: Alan's Astro talk
Date: 01 Feb 1993 15:43:19 -0500 (EST)

Dear Mark,

Monday, April 26 is a regular astronomy seminar day and it is open, so
I have pencilled Alan Bridle's talk in for that day. Please confirm it with him
and have him send me a title.

Jack

----- End of forwarded message -----

From: abridle (Alan Bridle)
To: mswain
Subject: BCD CLEAN/VTESS
Date: Thu, 18 Feb 1993 21:48:36 -0500

Nice image. As you say, looking a bit ragged around the core still, I can see the remnant of the strong NS sidelobe still. May be worth CLEANing the core down to about 1 mJy after all ...

From: abridle (Alan Bridle)
To: mswain
Subject: Filament questions
Date: Wed, 7 Apr 1993 20:47:14 -0400

Just to make a note of some of the topics that came out of the various discussions while we here re analysis of filaments. Not all of equal practicality re your thesis, but things we should try to sort through at some point:

1. Sources with good imaging of filaments to throw into the analysis: 3C353, Fornax A (get from Ed), Cygnus A (get from Chris -- you are organizing this (?), important to do before he gets into move-to-Leiden panic)
2. Q: is there evidence for/against filaments being a surface rather than volume feature? Important because many instabilities that theorists would like to drive filaments could work best on the lobe boundaries rather than throughout their volume. Need to ask whether filament brightness distributions are more consistent with empty-shell or filled-sphere models (e.g. by radially averaging filament brightness around lobes after filtering out any "smooth" components?)
3. Q: is there a common power spectrum of filament brightnesses in all lobes? Dissect out filamented regions of lobes, perhaps with median-filter replacement of hot spots and jets, then look at (a) 2-d power spectra from inverse transforms, correcting for edge effects, (b) 2-d structure functions (sanity check - should give same answer), (c) 1-d power spectra averaged across the elongation axis for "cylindrical" lobes in which filaments look "combed" (3C353W, Cyg both) and (d) 1-d power spectra averaged radially in "round" lobes in which filaments look "tangled" - (3C353E, Fornax both).
4. If answer to (3) is "yes", and especially if 3(c) and 3(d) suggest that these lob/filament forms might really be the same thing seen at different orientations, then the "common" spectrum becomes a target for theorists. Jean E. thinks it will be far enough removed from "standard" spectra such as Kolmogorov or Kraichnan (MHD) to need much detailed modeling (way beyond scope of thesis!) but if existence of a "standard" spectrum would provoke theorists' interest!
5. Q: What do the surface brightness histograms of filamented lobes look like? (destroys spatial information but contains some constraints on emissivity distribution which could relate to distribution of field intensities as suggested in Jean's paper. Again, evidence for a common form will be interesting, much less to be done if they're all different.
6. Connections: do filaments originate at/near hot spots or jets? Do scales, brightness contrast, spectral curvature evolve with position relative to jets, hot spots? Is there any evidence for/against jets termination shocks/turbulence as the "trigger" for filament formation?
7. Consequences of filamentation for standard equipartition, energetics / pressure balance/ ageing sums in radio lobes. How

wrong can parameters derived from "smooth lobe" assumptions be in presence of widespread filamentation?

8. Comparison of filament length scales and spectra with models of particular instabilities -- Jean will suggest a "short list" of things to try here, including some unpublished work on plasma instabilities. Only detailed comparison with growth rates so far has been M87 (something also in Chris' thesis re Cygnus?) but Fornax and 3C353 may suggest different regime. Problem here will be lack of X-ray data, but we can at least consider the two "basic" environments -- normal cluster and strong cooling flow -- as alternatives. In practice, the range of detectable environments at X-ray energies is not huge, and it may be a reasonable start to simply examine two "typical" cases.

I had another chat with Jean about what might be done by trying to model the synchrotron emissivity numerically based on codes that can handle turbulent MHD. There is a group at NRL that has a suitable code and Jean had discussed taking a crack at this with them some time ago. It got left on the back burner then because it was not clear what data they could compare results with. Jean feels that if there turn out to be any systematic patterns (common denominators re power spectra, etc.) in our 6 lobes (two for each of the 3 sources), this sort of study could be re-motivated. (Possible post-thesis followup here, but nothing on your pre-thesis time scale.)

Anyway, it all basically means that the directions that one might move in will depend on whether or not the answers to the observational questions contain common patterns. That we shall simply have to wait and see ...

Cheers, A.

From: abridle (Alan Bridle)
To: mswain
Subject: Filament Q. followup
Date: Thu, 8 Apr 1993 11:47:28 -0400

Just checking my mail, noticed I'd said "averaged radially"
in item 3(d) re filaments yesterday. I meant to say averaged
azimuthally. Sorry 'bout that, hope you didn't waste any time
wondering what I was getting at!

A.

From: mswain (Mark Swain)
To: abridle (Alan Bridle)
Subject: Re: Filament Q. followup
Date: Thu, 8 Apr 1993 13:00:42 -0400

Alan,

I've now read both the filaments message and the followup. In the "round" lobes, I think you would probably want to average both radially and azimuthally (seperately ofcourse). Both averages may be sensitive to what we define as the center lobe (that is, our choice of orgin for the coordinate system in which to do the averaging). One possible outcome would be that the 1-d power spectrums averaged both radially and azimuthally could be used to define a ratio for purposes of comparing "round" lobes.

Thanks for the list of topics on filaments. We need the multi-configuration C band images (I,Q,U) NOW.

Had a good talk with Hugh since he was out here for the Visitors meeting. He is up to speed now on what I have been doing recently. In even stronger language than Stefi, Hugh encouraged me (I think this means us) to publish by the end of the summer. He thought one paper would be a minimum and more would be better. Some of the power spectrum analysis of filaments might make a good skimming out topic since for a first cut, it could be done only at C band and only with 353. There wouldn't be any multifrequency/multisource comparison but that could come later.

Regards,
Mark

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: Filament Q. followup
Date: Thu, 8 Apr 1993 15:09:12 -0400

Hmm, I simply mis-wrote when I said "radial". What would you do with the radial averaging?

I disagree somewhat about the 353 power spectra being of stand-alone interest. Central to the whole question is whether there is a common power-law spectrum in a range of source powers and detailed morphologies. The only case to compare with from the literature is the one in Dean Hines' thesis (which I have now copied relevant parts of) for M87. And we will need to look at results of using same method on different sources -- Hines only touched the topic very obliquely and did not do much about removing systematic effects.

I think the potentially interesting stand-alone topics in 3C353 are:

1. The jet - limb-brightening and collimation properties
- relationship to counterjet
2. The infamous dark spot -- connection to filaments and
"intrinsic to 3C353" conclusion
-- implausibility of non-intrinsic models
-- symmetry w.r.t. other lobe

I don't feel that we can do much service to science by splitting one aspect of the filament analysis and treating it as a stand-alone. To make much sense of the filamentation problem we will need to bring in all of its aspects and this would wait until we have the multi-frequency analyses done, in my opinion.

Let's get some results first, then worry about what to publish and when!

A.

From: abridle (Alan Bridle)
To: mswain
Subject: Cyg A
Date: Thu, 8 Apr 1993 15:48:03 -0400

I just had another talk with Chris Carilli re using the Cyg A data. he will load the full-resolution 6cm I image and any others he can lay hands on quickly to his workstation disk and will then E-mail you re ftp'ing them. He wants to talk to Rick before doing the same with their 3.6cm Cyg A data as these aren't fully "used" yet.

He leaves in August and is clearly going into pre-departure "panic mode" already so best to nail down getting this data a.s.a.p.!

He also mentioned that Wayne Christiansen's student who was working on fractal analysis of lobes has finished his Ph.D. and gave a dissertation presentation at the AAS meeting in Phoenix. As he was given the Cyg A and 3C353 data to work with we need to know what came out of that. Wayne had said he would come up to C'ville last Fall to talk about it but never could pin him down to a date (he's become dean of Research or something like down there). I'll get back in touch with him to find out more, see if we can get a copy of the thesis, and maybe we should either go down to Chapel Hill or again try to set up a time for Wayne to come to C'ville so we can get together about that he's done.

A.

From: abridle (Alan Bridle)
To: waco@unc.bitnet
Subject: Lobe analysis
Date: Thu, 8 Apr 1993 15:57:32 -0400

Hello again Wayne,

I was just talking to Chris Carilli at the AOC and he mentioned to me that your student who was working on fractal analysis of lobes had written up his thesis. I have a student who is just starting to work on various aspects of the filamentation in Fornax A, 3C353 and Cygnus, so I'd be very interested first to have a copy of the thesis to look at if possible and then to see if we might get together some time over the summer to talk about lobe physics and what this might all mean.

With best wishes,

Alan B.

From: mswain (Mark Swain)
To: abridle (Alan Bridle)
Subject: Re: Filament Q. followup
Date: Thu, 8 Apr 1993 17:12:40 -0400

I agree that we need results before we worry about publishing. I just wanted to make the point that Hugh was reiterating Stefi's comment about publishing something "quick and dirty" and that I thought a stand alone analysis of the 353 filaments might be one choice for that. Maybe it's not the best choice. One interesting question will be what fraction of the lobe power is in filaments. That is interesting to know for 353 all by it's self; it's even more interesting to know for several sources.

As soon as Chris gives me the "ok", I will start ftp'ing all the Cyg A data he and Rick will let me have.

I fear that treating the dark spot properly will require a multi frequency data set; wheather that lends it's self to the "quick and dirty" analysis is therefor unclear.

From: abridle (Alan Bridle)
To: mswain
Subject: Spectral analysis
Date: Thu, 8 Apr 1993 18:04:02 -0400

Hello again Mark,

I just had a further talk with Chris C. about the spectral analysis code that he and Paddy had used within AIPS. It's not part of the standard AIPS distribution so will have to be compiled from source and separately linked to AIPS (we'll need some help with details on this from the AIPS people). But bottom line is that Chris will E-mail you the source code some time very soon.

A.

From: mswain (Mark Swain)
To: abridle (Alan Bridle)
Subject: Re: Rochester
Date: Mon, 12 Apr 1993 16:06:20 -0400

Alan,

The new qual date and time is Monday, the 26th at 1:00 pm.
The qual may run right up until the time of your talk at 4:00.
Since the qual is now on Monday, we have the option of leaving
on Tuesday. Have you spoken to Jack Thomas about having
Rochester provide a hotel for you on Sunday and Monday nights?

The correct email address to send your c.v. to is:

JUNE@BUCKWHEAT.PAS.ROCHESTER.EDU

Mark

From: abridle (Alan Bridle)
To: june@buckwheat.pas.rochester.edu
Subject: Vita for A.H.Bridle
Date: Mon, 12 Apr 1993 16:21:05 -0400

Attn: Betty Cook
Administrative Assistant for Graduate Studies
Department of Physics and Astronomy

I am supervising Mark Swain's Ph.D. thesis research while he is in the NRAO pre-doctoral fellowship program. Mark recently mentioned to me that you will need a copy of my c.v. on file at Rochester before he takes his Ph.D. qualifying exam later this month. Here is a very brief version. Please let me know if any further information is needed and I will update it accordingly.

Alan Bridle
NRAO, Charlottesville
(abridle@nrao.edu)

=====

A.H.Bridle - Vita

Name: Alan Henry Bridle

Birth: 2 September 1942
Harrow, U.K.

Education: Secondary (1954-1960):
University College School, London, U.K.

Undergraduate (1960-63):
University of Cambridge, U.K.
B.A. (Theoretical Physics), First Class Honours, 1963

Graduate (1963-67):
University of Cambridge, U.K.
Ph.D. (Radio Astronomy), 1967

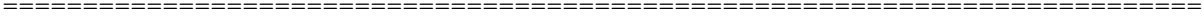
Positions held:

1967 Postdoctoral Fellow, Cavendish Laboratory, Cambridge, U.K.
1967-73 Assistant Professor of Physics, Queen's University, Canada
1970 Visiting Assistant Scientist, National Radio Astronomy
Observatory
1973-79 Associate Professor of Physics, Queen's University, Canada
1979-83 Professor of Physics, Queen's University, Canada
1980-82 Visiting Scientist, National Radio Astronomy Observatory
Adjunct Professor of Physics, University of New Mexico
1983-93 Scientist (Basic Research), National Radio Astronomy Observatory
Research Professor of Astronomy, University of Virginia

Current address:

Alan H. Bridle
National Radio Astronomy Observatory
520 Edgemont Road
Charlottesville, VA 22903-2475

Telephone: (804)-296-0375
InterNet: abridle@nrao.edu



From: abridle (Alan Bridle)
To: jhth@db1.cc.rochester.edu
Subject: Talk visit
Date: Mon, 12 Apr 1993 16:34:26 -0400

Hello again Jack,

Mark Swain has just told me that he's (re)scheduled his qualifying exam so it looks as if we can now make some definite arrangements re coming and going. Mark and I will travel together in my car arriving in Rochester in the evening of Sunday, April 25th and will return together, leaving on the morning of Tuesday, April 27th.

Could you have someone arrange me some accommodation for the nights of Sunday, April 25th and Monday, 26th?

Thanks much. I am looking forward to visiting with you all.

Alan Bridle

From: MKFA@spanky.pas.rochester.edu
To: abridle@polaris.cv.nrao.edu
Subject: Hotel reservations
Date: Tue, 13 Apr 1993 09:58 EST

Prof. Bridle,

I have arranged hotel reservations for you at the Hampton Inn. Take 390 north to exit #16 (E. Henrietta Road - Rt. 15A) the Inn is just south of the expressway, next to Grisante's (Mark should know exactly where this is).

Hampton Inn
717 East Henrietta Road
Rochester, NY 14623
716-272-7800

Your confirmation number is 88131242.

-Marilee, Asst. to J. H. Thomas

From: abridle (Alan Bridle)
To: MKFA@spanky.pas.rochester.edu
Subject: Re: Hotel reservations
Date: Tue, 13 Apr 1993 11:39:00 -0400

Thanks for reserving the hotel room for my visit, Marilee.

I'll probably be arriving later than 6 p.m. on the Sunday evening, but I presume the reservation is guaranteed so that won't matter?

Thanks again,

Alan Bridle

From: Chris Carilli <ccarilli@aoc.nrao.edu>
To: abridle
Subject: image
Date: Mon, 26 Apr 93 06:29:12 MDT

i've put the cygnus a 6cm, 2cm, and 20cm images in my FITS area. you'all can grab them at your leisure. following are instructions. the images are called: CYGNUSA.6CM etc...
i suppose these will keep you busy for a while. keep me informed as to what you'all are doing. it was nice having you here. hope to see you in leiden.
cc

to FTP files to/from my machine, the things to do are:

```
first:      ftp 146.88.6.3  (my machine = ranger)
then login: aips           (aips passwd: Cyg_X-3)
then:      cd /DATA/RANGER_1/FITS (where images are stored)
then:      ls              (to see what's there)
```

make sure to set binary before data transfer.

From: abridle (Alan Bridle)
To: Chris Carilli <ccarilli@aoc.nrao.edu>
Subject: Re: image
Date: Wed, 28 Apr 1993 08:58:19 -0400

Hi Chris

Just got back from Rochester and found your Monday message re the Cyg A images. Have copied across all that were there in your FITS area, and took a quick look at them to make sure they're ok. The 2cm image is a small (257 by 257) subimage of just the Sf hot spot at 0.12 by 0.11 resolution. Was that the one you intended?

Shall I ask Mark to arrange something with you re copying across the spectral-aging source code, (or do you want to E-mail it to him if that's simpler for you?).

Thanks a bunch for these, A.

From: Chris Carilli <ccarilli@aoc.nrao.edu>
To: abridle@polaris.cv.nrao.edu
Subject: Re: image
Date: Wed, 28 Apr 93 07:02:13 MDT

i'll email code today.
cc

From: abridle (Alan Bridle)
To: Chris Carilli <ccarilli@aoc.nrao.edu>
Subject: Re: image
Date: Wed, 28 Apr 1993 12:12:48 -0400

Hi Chris,

Just to clarify, I did an mget CYGNUSA.* from ranger this morning and got more than the radio images (we've deleted the X ones as soon as we realized they were X-ray, not X-band, of course) but maybe less than you thought was there at U-band. Sorry for any confusion. I'll leave it to Mark to sort out any remaining details with you.

Cheers, A.

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: forwarded message from Barry Clark
Date: Tue, 1 Jun 1993 11:20:16 -0400

Just tidying up loose ends from last week ...

Re you going out to NM for the C-array run, this will work out well as I'm going to be away from C'ville from July 29 to Aug 16th. I.e. you'd be "flying solo" for those two weeks in any case. Put in a travel authorization request to Bob Brown to make him aware of your plans as soon as you've decided how long to go out for.

A.

From: Barry Clark <bclark@aoc.nrao.edu>
To: abridle
Subject: AS 479
Date: Wed, 28 Jul 1993 08:08:22 -0600

I have an extra half hour for your slot next week that I couldn't find another use for: July 31 at 1600 LST to August 1 at 2030 LST.

From: mswain (Mark Swain)
To: abridle
Subject: Julian day number
Date: Wed, 28 Jul 1993 14:47:58 -0400

According to Phill Hicks, the Julian day number refers to the siderial day.

Mark

From: mswain (Mark Swain)
To: abridle
Subject: Socorro report
Date: Thu, 12 Aug 1993 14:47:16 -0400

Alan,

I thought I would give you a brief summary of this trip while it is still fresh in my mind. On the whole, it has been a very useful trip due to the advice of Mark Holdaway and Frazer Owen.

The computing situation has been a continued frustration. It is my impression that mx cleans run considerably slower on this machine (Aztec) than on rhesus. Further, upon finishing a large mx clean, the machine must be rebooted. I have talked extensively with the personnel here and sent mail to Pat Murphy but no solutions have materialized. According to Gustave, this problem has been seen by other people; the source of the problems is a subject of much contention presently. The basic problem is that boid processes seem to get created under certain quasi-repeatable conditions. These processes start consuming a significant fraction of the cup as measured by monitor -top. However, the impact of the boid processes on the execution speed of a task seems to be out of proportion to how much of the cup they take up. Thus if boid processes take up 50% of the cpu, a given task might take 4 or 5 times as long. This problem is localized to the IBM machines.

My strategy for the image reduction was to put the arrays together as fast as possible. I used a B model (after carefully checking for evidence of fringing) to cross calibrate the C uvdata set. As soon as possible, I cross calibrated the D array data on the BC model. The combined BCD data set has been self-called onec and imaged twice (for the east pointing). Problems in the clean image are apparent; problems in the vtess image are severe. The clean image has several problem fringes localized to specific regions of constant surface brightness - the classic clean instability. The vtess image is dominated by a high frequency fringe which covers the entire image. Back transforming the vtess image revealed a spike at the uv distance corresponding to the spatial frequency of the image-wide fringe. I removed the uv data associated with the bright feature in the uv domain and reimaged the data set. Again, an almost identical fringe was present; back transforming showed a new peak in the uv plane. Back transforming the dirty map shows a family of peaks in the same area. For some reason, vtess makes a map suffering the effects of only one of this family at a time. However, kill off one of the peaks and vtess suffers from another. I am currently experimenting with restricting the uv range to exclude this family of peaks in the transform of a dirty image. My intent is not to proceed with further calibration until I can get decent looking vtess images.

I suspect the above problem is identical to the fringe problem we were having with the C band A array image; at least the problems look very similar in the image domain. By the way, in neither the C band A array fringe case nor in the X band BCD array fringe case do the uvdata responsible for the fringe show up in a radially averaged uvplot.

In discussions with Frazer about the artifacts (fringes) present in the C band BCD config images, I characterized the fringes as features which were present in both the cleaned images and the vtess images and thus that the artifacts must have been calibrated in since they were not originally present. Frazer's response was that this problem is not the classic clean instability. According to him, the classic clean instability is caused by uv putting too much or too little flux in between uv tracks in the uv domain. Since this "errant" flux lies in a region where there are no visibilities, it can not affect the uv data in self calibration. Thus fringes arising from the clean instability can not calibrate themselves in to the uv data *and* these artifacts should go away under an mem deconvolution. Now, since our fringes stay in place under an mem deconvolution, Frazer claims we are in a whole different ball game. My intent is to image each of the configurations separately on identical grids and see if one configuration has the fringes. If that doesn't work, we may have a big problem; calibrating off vtess images might be the only solution. Although calib can accept an image as an input model, that feature is said not to work. We can, however, back transform a vtess image and divide it into the data with uvsub, resort the visibilities and put the result into calib. I haven't tried this yet but Frazer has done it quite a bit.

Frazer also pointed out that the spectral index maps I made of the source are invalid since a lobe component was not subtracted from the total intensity images at each frequency. While his point is true in principle, it may be very difficult to define a "lobe component" in this source. High resolution images don't show any places (or not many any how) where I can convince myself that I am looking "between" filaments to some underlying lobe component. Running the source through a uv filter won't work because the filaments are too long.

We really need the extra D array time at X band to make a good image. The off source large scale structure is still very prominent.

I trust your holiday went well.

Mark

From: mswain (Mark Swain)
To: abridle
Subject: forwarded message from Bill Cotton
Date: Fri, 20 Aug 1993 09:32:51 -0400

----- Start of forwarded message -----

Received: from gorilla.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
id AA06002; Thu, 19 Aug 1993 20:29:35 -0400
Received: by gorilla.cv.nrao.edu (4.1/DDN-DLB/1.5)
id AA00887; Thu, 19 Aug 93 20:29:02 EDT
Message-Id: <9308200029.AA00887@gorilla.cv.nrao.edu>
References: <9308192115.AA17559@polaris.cv.nrao.edu>
From: bcotton@gorilla.CV.NRAO.EDU (Bill Cotton)
To: mswain@polaris.cv.nrao.edu (Mark Swain)
Subject: Re: mx image size
Date: Thu, 19 Aug 93 20:29:02 EDT

MX could probably be coaxed into making 8k images although it involves buffer sizes as well as the allowed image sizes. Also it's likely to run afoul of equivalences. A stronger reason for not doing this is that few if any other tasks (or AIPS) can handle an 8k image. If you could rotate it so it came out 4k x 8K that might work.

- -Bill

----- End of forwarded message -----

From abridle Tue Oct 19 14:15:42 1993
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
["3303" "Tue" "19" "October"
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thread-indent "\"Abstract draft\""\n") nil]
nil)
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
id AA14722; Tue, 19 Oct 1993 14:15:42 -0400
Message-Id: <9310191815.AA14722@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: mswain
Subject: Abstract draft
Date: Tue, 19 Oct 1993 14:15:42 -0400

How's this?

=====

% AASABSMP.TEX -- AAS meeting electronic abstract sample.

% Don't remove the following comments; they identify the form.

%

% American Astronomical Society electronic abstract form.

% Meeting #183, January 11-14, 1994

%

% Abstract DEADLINE: October 23, 1993

\documentstyle[11pt,aasab]{article}

\nofiles

% Please leave runningident and session intact; don't delete them.

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%\session{}{}

% In many of the commands that follow, sample information has been
% entered between the curly braces {}. You should delete this text
% and replace it with your own correct information. Please refer
% to the instructions if you have any questions.

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%\instructions{}               % OPTIONAL

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%\societysig{Ed./Demos}       % OPTIONAL
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%\societysig{ROSAT}          % OPTIONAL
%\societysig{WGAIT}          % OPTIONAL
%\societysig{WGAS}           % OPTIONAL

\firstauthor{M.R.Swain}        % REQUIRED
%\sponsor{}                   % OPTIONAL
\authoraddress{NRAO\520 Edgemont Road\Charlottesville, VA 22903}
\authorphone{804-296-0294}    % REQUIRED
\authoremail{mswain@nrao.edu} % OPTIONAL
\paymentmethod{PO}           % REQUIRED
\accountnumber{40101-7031}    % REQUIRED
\expirationdate{}
\billingaddress{NRAO\520 Edgemont Road\Charlottesville, VA 22903}

\begin{document}

\category{18}
\title{High-resolution VLA images of the jets and filaments in 3C353}
\author{M.R.Swain, A.H.Bridle}
\affil{NRAO}
\author{S.A.Baum}
\affil{STScI}

\begin{abstract}

3C\,353, a wide-lobed double source that is the fourth brightest radio
galaxy in the 3C Catalog (57 Jy at 1.4 GHz) is associated with an
elliptical galaxy in a Zwicky cluster at  $z=0.0304$ . Previous VLA
observations detected a jet and counterjet, well defined but weak hot
spots (typical of sources just above the Fanaroff-Riley Type I to II
transition), and a rich complex of large-scale filaments throughout
both lobes, which cover over 5 arcmin on the sky..

We present sensitive new, high-resolution ( $0.4''$  FWHM)
images of 3C\,353 in total and polarized intensity obtained by
combining data from the VLA's A,B,C and D configurations at 4.9 GHz.
These images reveal further structural complexity in both the jets and
the filaments.

The jet contains compact linear features oblique to its symmetry axis,
and several asymmetrically-placed knots within a smooth,
well-collimated envelope of emission. The counterjet is similarly
well-resolved but also well-collimated.

```

The filaments contain a hierarchy of transverse scales, with some apparent pairing of sub-filaments (or center-darkening of ribbon-like features). Some filaments are fully-resolved but others contain regions of relatively bright, unresolved substructure. Work is in progress to determine the spectral and polarimetric characteristics of this hierarchy of structures in the filaments.

A dark spot that is prominent on lower-resolution radio images at all radio wavelengths is now seen to be connected to other structure in the east lobe. Its origin remains unclear.

`\end{abstract}`

`% Don't remove or comment out.`

`\admininfo`

`\end{document}`

From: abridle (Alan Bridle)
To: sbaum@stsci.edu
Subject: Draft of an AAS poster abstract - 3C353
Date: Tue, 19 Oct 1993 14:59:52 -0400

Hi Stefi

We want to have a show-and-tell featuring Mark with the A+B+C+D images at the AAS in Washington. Here's a draft of the abstract. Is this o.k. by you? We can talk about details of what to say/do in the poster when you visit in December.

Best wishes

Alan

=====

% AASABSMP.TEX -- AAS meeting electronic abstract sample.

% Don't remove the following comments; they identify the form.

%

% American Astronomical Society electronic abstract form.

% Meeting #183, January 11-14, 1994

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% Please leave runningident and session intact; don't delete them.

%\runningident{}

%\session{}{}

% In many of the commands that follow, sample information has been
% entered between the curly braces {}. You should delete this text
% and replace it with your own correct information. Please refer
% to the instructions if you have any questions.

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%\societysig{HEAD II/SN} % OPTIONAL

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%\societysig{WGAIT} % OPTIONAL

%\societysig{WGAS} % OPTIONAL

\firstauthor{M.R.Swain} % REQUIRED

%\sponsor{} % OPTIONAL

\authoraddress{NRAO\520 Edgemont Road\Charlottesville, VA 22903}

\authorphone{804-296-0294} % REQUIRED

\authoremail{mswain@nrao.edu} % OPTIONAL

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\expirationdate{}
\billingaddress{NRAO\520 Edgemont Road\Charlottesville, VA 22903}

\begin{document}

\category{18}
\title{High-resolution VLA Images of the Jets and Filaments in 3C353}
\author{M.R.Swain, A.H.Bridle}
\affil{NRAO}
\author{S.A.Baum}
\affil{STScI}

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the east lobe. Its origin remains unclear.

\end{abstract}

% Don't remove or comment out.

\admininfo
\end{document}

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From: abridle (Alan Bridle)
To: mswain
Subject: forwarded message from Wil van Breugel
Date: Tue, 2 Nov 1993 19:34:35 -0500

----- Start of forwarded message -----
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
id AA39609; Tue, 2 Nov 1993 18:45:32 -0500
Received: from sundial.llnl.gov by cv3.cv.nrao.edu (4.1/DDN-DLB/1.13)
id AA22308; Tue, 2 Nov 93 18:45:27 EST
Received: by sundial.llnl.gov (4.1/LLNL-1.18)
id AA06714; Tue, 2 Nov 93 15:38:22 PST
Message-Id: <9311022338.AA06714@sundial.llnl.gov>
From: wil@sundial.llnl.gov (Wil van Breugel)
To: adv@sundial.llnl.gov
Subject: post doctoral positions
Date: Tue, 2 Nov 93 15:38:22 PST

Dear colleague, we would appreciate if you could bring the attached advertisement to the attention of interested candidates. Please note that American citizenship is NOT a requirement for these positions (contrary to the advertisement in the AAS bulletin and Physics Today).

POSTDOCTORAL POSITIONS IN ASTROPHYSICS

University of California
Institute of Geophysics and Planetary Physics
Lawrence Livermore National Laboratory

The

Institute of Geophysics and Planetary Physics (IGPP) at Lawrence Livermore National Laboratory (LLNL) anticipates having several postdoctoral positions available in its astrophysics program starting in the fall of 1994. In addition, depending on a successful completion of the HST refurbishment mission at the end of 1993, it is expected that one or more postdoctoral NASA/HST funded positions will be available for collaborations with IGPP staff and postdocs on HST observations of radio galaxies and quasars.

Successful candidates for the IGPP/LLNL positions will be expected to conduct a vigorous and significant program of independent research. Applicants' fields of research may be in any area of astrophysics: observational, theoretical, computational, or experimental. Areas being pursued by IGPP and LLNL staff include high energy astrophysics, plasma astrophysics, nuclear and particle astrophysics, star formation and stellar evolution, X-ray binaries, galactic radio and infrared studies, galaxy formation and evolution, active galactic nuclei, extra-galactic radio sources, and cosmology. Major projects currently underway at IGPP/LLNL are:

- 1) The development of adaptive optics and laser guide star systems for use at the Lick and Keck observatories, which will allow to correct for atmospheric seeing effects (Claire Max);
- 2) Searches for dark matter (Massive Compact Halo Objects - MACHO's) at Mount Stromlo Observatory (Australia) using novel large field of view optics and large format CCD's (Charles Alcock);
- 3) Ground- and space-based observational studies of various

radio source populations, including high redshift radio galaxies and quasars, imaging and spectropolarimetry of nearby radio galaxies, and superluminous far infrared galaxies (Wil van Breugel);

4) The FIRST (Faint Image of the Radio Sky at 21 cm) all sky radio survey with the Very large Array (B-configuration) which will provide a catalog of millions of radio sources for comparison with surveys in other wavebands (Bob Becker).

Candidates for the NASA/HST funded position(s) will be expected to participate in ongoing work related to several approved HST cycle 4 projects on imaging polarimetry, high redshift radio galaxies, and quasars.

Postdoctoral fellows at IGPP will have access to LLNL's unique resources including supercomputers, the facilities of LLNL's Laboratory for Experimental Astrophysics (LEA), and Lick Observatory. IGPP also supports research with a 10 micron imaging camera in collaboration with LEA and the Space Sciences Laboratory at UC Berkeley, and with an automated fiber-fed multi-object spectrograph designed and built at LEA in collaboration with UC Santa Cruz faculty.

We especially encourage candidates to apply with interest in the following areas:

- - optical and infrared imaging and spectropolarimetry,
- - multi-object spectroscopy,
- - Galactic and extra-galactic infra-red spectroscopy,
- - X-ray astronomy,
- - cosmology, including particle and nuclear astrophysics, and galaxy formation/evolution,
- - adaptive optics,
- - experimental dark matter searches.

IGPP has a large network of SUN workstations and access to LLNL's supercomputer and image processing facilities. All major astronomical image analysis programs are available. In a joint effort with UC Davis faculty software is being developed for fast and flexible analysis of large astronomical catalogs. The IGPP hosts collaborators from all campuses of University of California and has an extensive postdoctoral and visitor program.

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***** Please note: American citizenship is NOT a requirement. *****
(contrary to the advertisement in the AAS bulletin and Physics Today).

For further information please contact Dr. Wil van Breugel at IGPP,
Phone (510)-422-7195, FAX (510)-423-0238, or by email (Internet):
wil@sunlight.llnl.gov.

- -----
----- End of forwarded message -----

From: abridle (Alan Bridle)
To: mswain
Subject: AS510
Date: Mon, 15 Nov 1993 13:50:18 -0500

The tape may be here this afternnon if we're real lucky. If not,
it will be here this evening.

There's a huge snowstorm moving in. We can probably
expect poor phase stability as the front crossed the array.

Cheers, A.

From: mswain (Mark Swain)
To: abridle (Alan Bridle)
Subject: Re: AS510
Date: Mon, 15 Nov 1993 15:45:07 -0500

Well, it's going to be tomorrow before I start calibrating that data any way. I just finished the Hubble application - it has taken far more time than I thought it would. Stefi seems to like it though.

Redoing the C band, A array selfcalibration from scratch with all the uv data does not improve the residual fringe amplitudes in the slice ensemble when compared to selfcalibrating the the restricted uv data set. The bad news is that it means we are stuck with fringe like features in the image wich are of order the thermal noise. The good news is that we are finished with the A and B array calibration. Really, after the new D data is put in I think we will be through with C band.

Several more post-doc application deadlines are looming - I am going to try to do the bulk of the work associated with the applications before you get back.

I haven't worked on the data reduction chapter at all since before you left so shipping you anything on the 18th looks completely out of the question.

Please fax me a copy of the operators log when you put the filled data for C band on disk (fax#=804-296-0278).

Oh by the way, I reworked the observe file. I called up the observers who are scheduled directly before us and got the position in which they were leaving the array and put those coordinates into the starting conditions in observe. While the array still points at 353 before anything else, it has a built in one munite time interval for loading our observe file and an initial serries of six (3 pointings, twice each) short (2 or 3 min) observations for redundancy. It is now more unlikely that any of the really foreshotened baselines will be lost for any given pointing. I also carefully picked the times when NRAO 530 would be observed so that it would be observed in the same elevation angle range as the low elevations observations of 3C353. This is to test to see if we are picking up the LO signal because one antena has a near side-lobe looking at the back of another. The NRAO 530 vis function should always look like a point source to the D array (unless something very exciting has happened recently) and since I observe NRAO 530 at several elevations its visability function should not be time dependent!

Mark

From: abridle (Alan Bridle)
To: mswain
Subject: C Band data
Date: Tue, 16 Nov 1993 12:13:46 -0500

are on acoma in /DATA/ACOMA_1/FITS

as 353D1193C.CBAND

There were 13038 shadowed visibilities out of 39440

FAX of operator's log is in secretary's pipeline.

A.

From abridle Tue Nov 16 15:50:49 1993

X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]

["451" "Tue" "16" "November" "1993" "15:50:48" "-0500" "Alan Bridle" "abridle "

nil "15" "X Band data" nil nil nil "11" nil nil (number " " mark " Alan Bridle

Nov 16 15/451 " thread-indent "\"X Band data\""\n") nil]

nil)

Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)

id AA15666; Tue, 16 Nov

1993 15:50:48 -0500

Message-Id: <9311162050.AA15666@polaris.cv.nrao.edu>

From: abridle (Alan Bridle)

To: mswain

Subject: X Band data

Date: Tue, 16 Nov 1993 15:50:48 -0500

are on acoma in /DATA/ACOMA_1/FITS/353D1193X.XBAND

30280 of 89884 visibilities were shadowed.

The shadowing is the price you pay for having some very short baselines in the dataset. It should be no problem providing not all of the calibrator data is shadowed for antennas that can contribute to the 3C353 ultrashort spacings.

FILLM drops the shadowed data, so what you have left is the "good stuff". I hope there's enough of it.

Cheers, A.

From: mswain (Mark Swain)
To: abridle (Alan Bridle)
Subject: Re: C Band data
Date: Tue, 16 Nov 1993 18:11:46 -0500

Alan,

I'm confused. Does the C band data I retrieved from acoma contain shadowed visabilities? Your first message said that 13038 visabilities our of 39440 were shadowed in the C band data. Your second message said that FILLM threw out the shadowed visabilities for the X band data. Does that imply that you filled the C band data and the X band data with two different inputs (ie keep shadowed data for c band but throw it out for x band)?

The C band data I retrieved fro acoma has 39440 visabilities so until I hear otherwise, I am assuming that shadowed data is included. I'm am unclear about the consiquences shadowed keeping shadowed data.

Mark

From mswain Tue Nov 16 19:41:09 1993
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
["373" "Tue" "16" "November" "1993" "19:41:08" "-0500" "Mark Swain" "mswain "
"<9311170041.AA26608@polaris.cv.nrao.edu>" "10" "C band calibration" nil nil nil
"11" nil nil (number " " mark " R Mark Swain Nov 16 10/373 " thread-
indent "\"C band calibration\""\n") nil]
nil)
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
id AA26608; Tue, 16 Nov 1993 19:41:08 -0500
Message-Id: <9311170041.AA26608@polaris.cv.nrao.edu>
From: mswain (Mark Swain)
To: abridle
Subject: C band calibration
Date: Tue, 16 Nov 1993 19:41:08 -0500

Alan,

The antenna gains for 3C286 and NRAO 530 consistantly differ by a factor of 2. Since these observations overlap in time, it is improbable that the gains represent something physical about the array. Could this some how be related to having shadowed data in with the "good" data? Those were amplitide gains by the way. The phase gains are nice and stable.

Mark

From abridle Tue Nov 16 22:25:34 1993
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
["1177" "Tue" "16" "November" "1993" "22:25:34" "-0500" "Alan Bridle" "abridle "
" nil "25" "Re: C band calibration" nil nil nil "11" nil nil (number " " mark "
Alan Bridle Nov 16 25/1177 " thread-indent "\"Re: C band calibration\""\n")
nil]
nil)
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
id AA14893; Tue, 16 Nov 1993 22:25:34 -0500
Message-Id: <9311170325.AA14893@polaris.cv.nrao.edu>
References: <9311170041.AA26608@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: C band calibration
Date: Tue, 16 Nov 1993 22:25:34 -0500

FILLM was run the same way both times, and reported the number of shadowed visibilities. I passed these on to you as reported by FILLM in both cases, i.e. both data sets have approximately 1/3 of the data shadowed.

I was under the impression that FILLM was flagging them as bad using the 25-m spacing criterion. This is valid provided all of the antennas are pointing in the same direction. It will not catch shadowing by an antenna that is pointing elsewhere, as the uv dataset has no way of knowing whether antennas are pointing if they are not participating in the observation. This could arise from the antennas that are stowed for repairs, etc.

I believe that the number of data points in the FITS header includes both flagged and unflagged data. The simplest way for you to test, other than via LISTR, would be to run UVCOP invoking the option to discard all of the flagged data. The output data set should then be

smaller by the number of shadowed visibilities.

All shadowed data must be discarded. There is no way to correct for the fact that the shadowed dish has neither the same illumination nor the same effective phase center as an unshadowed dish.

A.

From: mswain (Mark Swain)
To: abridle (Alan Bridle)
Subject: Re: C band calibration
Date: Wed, 17 Nov 1993 09:42:35 -0500

Alan,

The C band data have no flagged visabilities. There isn't even a flag table. I suspect that FILLM was not flagging the shadowed visabilities as bad.

I checked your inputs to FILLM and cparm(4)=0 so data within the 25 meter limit should have been dropped. But it was not dropped by flagging because neither of the uv data file sitting on acoma's disk have any FG tables.

Is there some possibility that the shadowed data never make it off the tape? In that case the 39440 visabilities in the C band data would all be good *and* the 13000 odd bad visabilities never made it off the tape.

Mark

From: mswain (Mark Swain)
To: abridle
Subject: FILLM
Date: Wed, 17 Nov 1993 09:52:27 -0500

Pat checked the code for FILLM; shadowed data never
get off the tape with cparm(4)=0.

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: FILLM
Date: Wed, 17 Nov 1993 11:37:29 -0500

Sounds good, even safer than flagging.

If there are no shadowed data, the factor of 2 discrepancy you mentioned between amplitude gains on NRAO 530 and 3C286 calls into question the method by which you determined the flux density for NRAO 530.

Did you somehow manage to derive a flux density for NRAO 530 that was off by a factor of 2? Did you put in the correct flux density for NRAO 530 using SETJY?

I can't think of anything else that would lead to a factor of 2 discrepancy at C Band, especially not if it is repeatable between the 286/530 comparisons and if it affects all antennas.

A.

From: mswain (Mark Swain)
To: abridle
Subject: C band data
Date: Wed, 17 Nov 1993 18:42:36 -0500

The indication is that the additional C band data reduces the amplitude of the large fringe 3C353 sits on top of from a peak-to-peak amplitude of 55 mJy to 16 mJy.

Also, I was mistaken about the additional uvdata not improving the A array calibration. It seems to improve it considerably.

From: mswain (Mark Swain)
To: abridle (Alan Bridle)
Subject: Re: C band data
Date: Thu, 18 Nov 1993 08:59:14 -0500

I tried making an assessment of recalibration of the A array data (using all baselines) without looking at the SN plots - and I got bitten in the booboo.

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: C band calibration
Date: Thu, 18 Nov 1993 11:25:08 -0500

Mark Swain writes:

> Alan,
>
> The antenna gains for 3C286 and NRAO 530 consistantly differ
> by a factor of 2. Since these observations overlap in time,
> it is improbably that the gains represent something physical
> about the array. Could this some how be related to having
> shadowed data in with the "good" data? Those were amplitide
> gains by the way. The phase gains are nice and stable.
>
> Mark

This was the message that I did not understand. What
was going on here?

A.

From: mswain (Mark Swain)
To: abridle (Alan Bridle)
Subject: Re: C band calibration
Date: Thu, 18 Nov 1993 13:34:03 -0500

Oh that. I looked at the gains for NRAO 530 before I ran getjy. Since I didn't fully understand what I was doing (ie, the gains solutions should be different until getjy is run) I attributed the difference gains of NRAO 530 and 3C286 as potentially due to some affect of shadowing. Since your original message implied that 13000 visibilities out of the 39440 visibilities present were bad, everything seeded self consistant.

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: C band calibration
Date: Thu, 18 Nov 1993 15:21:42 -0500

Mark Swain writes:

> Oh that. I looked at the gains for NRAO 530 before I
> ran getjy. Since I didn't fully understand what I was
> doing (ie, the gains solutions should be different until
> getjy is run) I attributed the difference gains of NRAO 530
> and 3C286 as potentially due to some affect of shadowing.
> Since your original message implied that 13000 visibilities
> out of the 39440 visibilities present were bad, everything
> seeded self consistant.

- OK, you might have noticed that the outer antennas in the D-array would not have been shadowed, so should not have behaved like this, however.

It was because you said all antennas showed the same effect that I suspected the flux density normalization process rather than shadowing.

Note that severe shadowing (50%, as you suspected) would not leave the phase gains undamaged. Indeed, if you move the center of the illumination of the dish by 6 meters by blocking off half the aperture, the phases have long since wound into oblivion. This is why never reading the shadowed data off the tape is a good idea!

Fine so long as all is now calibrating OK and there was enough data at ≥ 25 -m separations to straighten your images out.

I hope the 8-GHz stuff works as well.

Cheers, A.

From: mswain (Mark Swain)
To: abridle (Alan Bridle)
Subject: Re: Nov 15 data
Date: Tue, 23 Nov 1993 09:27:34 -0500

The X and C band new D array observations are on truchas disk and the polaris disk. I will be writting a tape shortly.

Currently, the best ABCD C band 353 image is catalog # 12 on rhesus disk 4 (filename=353-c-abcd.rstor.3). This image is made with restricted A configuration data so it's A config. calibration and resolution are not optimal; also it lacks the new D config. data.

I am trying to redo the multiconfiguration calibration using all the A array data. Currently, calib seems to be broken and Eric is investigating the problem.

From: abridle (Alan Bridle)
To: mswain
Subject: 353 image
Date: Tue, 23 Nov 1993 11:53:55 -0500

has no .HI file and is a couple of months old so my main question is whether it was done with the correct weighting (i.e. was UVSRT run on the data before MX)?

I'm having some more discussions with Jean and have grabbed the CLEAN from file 11 and am now writing out the MEM from file 12 so we have something better than her old stripey MEM copy to look at.

Got your note about the rhesus upgrade. Again I think the main questions are whether it is likely to take the machine for >24 hrs, and whether we will have the images we need for the poster much sooner in any case. We don't want to be making images just before we go to D.C., hopefully we'll be making the poster by then, not still reducing the data!

But if the AAS week is a good week for Paul and you don't think you can benefit from the faster cpu speed early in the data reduction, the strategy you suggested may be appropriate. I do not expect many people will be in CV trying to do data reduction that week.

A.

From: mswain (Mark Swain)
To: abridle (Alan Bridle)
Subject: Re: 353 image
Date: Tue, 23 Nov 1993 13:42:40 -0500

The image I recomended was made without running uvsrt on the data before mx clean. However, it had all uvdata from baselines >350kilolamda deleted. That effectively put all the data within the protion of the uv plane which is gridded correctly - at the price of resolution and calibration quality.

I am considering going up to Boston for a day to visit the SMA. I've talked to Jim Moran about the project some and it sounds like there are some interesting problems to work on. The real reason for going up would be to get specific descriptions of problems which are potentially interesting to me and so they can see me get all bright eyed and bushy-tailed (excited and eager) about working on these probems. It's a long trip and it would wipe out three days which I can put to good use here so... if you think it isn't worth my time to go up, tell me. Jim Moran seemed to think it would be "great" if I could come up but then again this is his pet project.

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: 353 image
Date: Tue, 23 Nov 1993 14:36:05 -0500

Re trip to Boston -- when? (you didn't say).

I would think that after the AAS meeting would be a good idea.

A.

From: mswain (Mark Swain)
To: abridle
Subject: letters of recommendation
Date: Wed, 24 Nov 1993 17:26:32 -0500

Alan,

There are 7 postdoc positions I am applying for which have Dec 15 deadlines and another with a Dec 20 deadline. Two of these, the Jansky Fellowship and a Leiden University postdoc, are very interesting to me. The Leiden University postdoc may reside in Groningen and it is implied that the postdoc will work on "studies of the early universe using radio sources".

"Various aspects of the program involve G. de Bruyn, P Katgert, G. Miley and R. Schilizzi." The letter should be addressed to G. Miley. As far as I can tell, this sounds like exactly what I want.

Would you like me to email you a list of addresses and deadlines for letters of refference due on or before Dec 20?

Mark

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: letters of recommendation
Date: Wed, 24 Nov 1993 18:22:36 -0500

Given that there's no mail out of here until I leave, and I'll be back in my office on the 6th, I think this can wait until I'm back when all the logistics will be simpler.

I'll have a letter ready to go to Miley in my laptop. Regular mail to Holland is <1 week and can anyway send an E-mail copy saying that the paper one is in regular mail.

Just have all of your list ready when I show up.

Miley's program will almost certainly be the high-redshift, steep-spectrum sample that he has been developing for a long time. No VLBI polarimetry content that I know of, or are you no longer concerned about that?

A.

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: 353 image
Date: Wed, 24 Nov 1993 18:24:51 -0500

Mark Swain writes:

>
> I am considering going up to Boston for a day to visit
> the SMA. I've talked to Jim Moran about the project
> some and it sounds like there are some interesting
> problems to work on. The real reason for going up
> would be to get specific descriptions of problems
> which are potentially interesting to me and so they
> can see me get all bright eyed and bushy-tailed
> (excited and eager) about working on these probems.
> It's a long trip and it would wipe out three days
> which I can put to good use here so... if you think
> it isn't worth my time to go up, tell me. Jim Moran
> seemed to think it would be "great" if I could come up
> but then again this is his pet project.

You didn't say when yet.

I think before the AAS isn't a great idea, after would be fine.

A.

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: Nov 15 data
Date: Wed, 24 Nov 1993 18:26:32 -0500

Mark Swain writes:

> The X and C band new D array observations are on truchas disk
> and the polaris disk. I will be writting a tape shortly.

So can I simply dispose of the versions here? You don't need
any more backup?

A.

From: mswain (Mark Swain)
To: abridle
Subject: Boston trip
Date: Wed, 24 Nov 1993 18:53:48 -0500

Originally, I thought I might go next week but I think your right that after the AAS would be a better time. I have told Jim Moran and company that I am now thinking about trying to go up there after the AAS meeting.

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: letters of recommendation
Date: Wed, 24 Nov 1993 19:38:55 -0500

He has a general interest in radio galaxies. My guess is that with this list of investigators his involvement is fairly minor. The others are all more likely to be the movers and shakers in that particular collaboration.

Only way to really assess where the emphasis might be would be to contact the people involved and ask them.

I thought this was an outgrowth of Miley's work on finding high-redshift, high-power sources by sifting through all the steep-spectrum ones (there being a correlation between intrinsic radio power and integrated spectral index). Take a look at the last Leiden Obs. annual report in the CV library, this should give some details.

A.

From: mswain (Mark Swain)
To: abridle (Alan Bridle)
Subject: Re: Boston trip
Date: Fri, 26 Nov 1993 19:44:37 -0500

The composit image seems to comming along fine. I've got the B cross calibrated on the A and I'm about to cross calibrate the C as well. The phase gain relative corrections are down to about +/- 5 degrees or better (best previous calibration for the A data was +/- 10 degrees or better). I'm carefully checking the clean components to maker sure the model does not contain any fringes. My goal is to keep rhesus busy as much as possible.

Eric has been experimenting with changing the AP size on ringtail. Because of this ringtail has been unstable and I have not started the X band calibration and imaging on that machine. I have been doing some timing test on ringtail and it seems that increasing the AP size does make mx run faster. Unfortunatly, Eric can't increase the AP memory size enough to do a 4kx4k deconvolution in memory without causing aips to break. He is working on chasing bugs excited by the large AP memory size.

From: mswain (Mark Swain)
To: abridle
Subject: polarization images
Date: Sun, 12 Dec 1993 21:31:41 -0500

Alan,

I tried making Q and U images with the current c band calibration. Two comments. First, when I made the %pol image by dividing the polc image by the cleanded I image, almost everything was blanked even when I set the blanking criteria for 0 sigma for the polc map and 1 sigma for the I map. I'm puzzled by that. Secondly, it still looks like there are deconvolution errors in the Q and U images. I cleanded both down to about 10 times the noise.

It seemed that the deconvolution errors looked as though they came for not cleaning deep enough so I cleaned the Q image much deeper. Unfortunately, the deconvolution errors appear to be just as pronounced (comparison made by blinking the images).

I tried using utess but it blew up. Something about buffer sizes.

The Q and U images remain as fuzzy as ever. I haven't split out the C and D data to see if the cross calibration degraded thier calibration in some sense. That's next on the list.

Mark

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: polarization images
Date: Mon, 13 Dec 1993 09:00:26 -0500

Blanking sounds like what you would get if the I blank was set too high, e.g. in wrong units.

Deconvolution errors on the strong features are usually a problem with calibration rather than with the actual deconvolution. Failure to deconvolve on the hot spots has been a symptom of improper PCAL solutions. Try it with just the B+C+D data, to see if the problem localizes to the A.

As for UTESS "buffer size error", write the error down and ask Bill or Eric whether they recognize it. Also try running UTESS on a smaller image set (e.g. B+C+D) and see whether you get the error there. It might be a problem with the 4k by 4k imaging that requires an array to be expanded in the code. But you need the actual error message, not just "something about buffer size", for anyone to diagnose what's going on.

I noticed that the B+C+D P image is somewhat fuzzy relative to the I image also. This is unusual, and may be real. I forget what the A-only P image looked like. Were there any significant features in it outside the hot spot and jet, or is all the P structure resolving?

A.

From: mswain (Mark Swain)
To: abridle
Subject: jet expansion rate plot
Date: Thu, 10 Mar 1994 18:34:21 -0500

Alan,

I seem to have misplaced the jet and counter-jet expansion rate plot I showed at the AAS meeting. Do you have a copy of that? If so, would you fax a copy of it to me here at the AOC? I would like to have around to show for Russian roulette.

Thanks,
Mark

From: mswain (Mark Swain)
To: abridle
Subject: VTESS/UTESS
Date: Fri, 11 Mar 1994 18:47:35 -0500

Alan,

I put the following 4 questions to Tim Cornwell:

- (1) Will he modify VTESS and UTESS to work with 8K images
- (2) What is the proper way estimate the noise for VTESS
- (3) What to do when VTESS fails to formally converge
- (4) What does it mean when VTESS gets a sigma of less than one but fails to converge; does the image in that case differ noticeably from one which has formally converged?

Replies:

(1) Tim has agreed to try to fix VTESS and UTESS this weekend so that they will support 8K images.

(2) The method I use for estimating the noise (standard, off source regions on a V map) is a very good way according to Tim; he could not suggest a better way.

(3) In the case where VTESS fails to formally converge but stops making progress (sigma and the gradient stop decreasing with additional iterations), then VTESS thinks the noise parameter is too low. In the case where the noise is estimated as described in (2), Tim maintains that VTESS has uncovered some inconsistency - such as the data not being well calibrated. Since it is at L band where I have trouble getting VTESS to converge, you may have a better idea if this could be true. I'll try to check when I get back.

Often when VTESS fails formally to converge but stops making progress, the images look very good. I asked Tim if they "functionally" differed from images for which formal convergence was achieved. His reply is that there is no "functional" (we never bothered to define what was meant by "functional" but in the context implied that scientific results would be invariant to a good approximation) difference for VTC images (convolved) but that there is for the VT (unconvolved) images.

(4) VTESS requires a gradient of $< .05$ and a sigma of < 1.05 to achieve formal convergence. When I showed a result meeting both criteria which still failed to converge, Tim replied that "VTESS is just being finicky" and that more iterations would formally do better but were probably not worth doing. In cases where the convergence criteria are met but formal convergence is not achieved, Tim said more iterations almost always cause formal convergence to be achieved.

Now a bit more about 8K images. It seems that Larry Rudnick is doing some observations of Cas A in a couple of weeks and needs 8Kx8K imaging ability. It seems that other (unnamed) parties want it as well. It also seems that some people do not approve of private copies of certain AIPS tasks and may

even be slightly annoyed by it. Their position might be tenable if AIPS had a reasonable level of support.

This may have the potential to ruffle a few feathers. Once 8Kx8K images are known to have been produced, other people will want the capability. I need only 4 tasks to work with 8K images (VTESS, UTESS, WFCLN and SUBIM) but I only need the inner 1/4. To be able to routinely work with 8Kx8K images, lots of tasks need to be changed. This may put the whole issue neatly in the middle of the AIPS support v.s. AIPS ++ debate.

Mark

From: mswain (Mark Swain)
To: abridle
Subject: AS529/%Pol images
Date: Thu, 17 Mar 1994 19:35:00 -0500

Alan,

The observations seem ok. I had some difficulty getting selfcal to "take hold" (get enough flux in the model to make any progress) but I think I have solved that problem. I have only been able to work on the East pointing but that image seems "ok" to first order. By this I mean that the core, hot-spots, jet and counter-jet all show up clearly. The data simply aren't calibrated well enough or deconvolved enough to see any filaments at this point. Because I can see the above mentioned features and because the model has enough flux prior to the first neg. cc to open the uv range, I conclude these observations have no catastrophic problems. The only problems I know of that occurred during the run were that I "stalled" the online system by lifting an interlocked printer cover and a power supply failure caused half the correlator to shut off for about two hours.

I have described the problems with the %pol maps to Rick Perley, Tim Cornwell, Mark Holaway and Ernie Sequist (I'm not positive about the spelling but he is from Toronto and he sends his regards). In each case, I told them that we had well calibrated data and that the Stokes I, Q and U maps as well as the P maps look good on their own but that the %P map has non-physical values. I also told them that I had done the deconvolutions under CLEAN and VTESS/UTESS respectively and that the MEM route delivered less extreme non-physical values for %P. I then asked "what is the problem and how do I get rid of it."

All four said (with varying degrees of certainty) that the problem was one of polarization deconvolution. Tim and Mark were particularly certain of this. It turns out the proper way to do a polarization deconvolution is to deconvolve I, Q, U, and V simultaneously subject to the constraint that $I^2 \leq \sqrt{Q^2 + U^2 + V^2}$. Mark Holdaway wrote a deconvolution program with such a constraint as part of his thesis and it is part of the Braindisse data reduction package. Unfortunately, a deconvolution with this constraint is not going to be implemented in AIPS before I defend.

I asked Mark how we could test his hypothesis that it is polarization deconvolution errors that are leading to problems with the %P maps. He recommenced simulating some data and deconvolving it - I am currently working on this.

I asked Jean Elick how big a problem was it if we had no %P information. She thinks that is not catastrophic and that there are several diagnostics of filament physics which do not depend on it. The diagnostics are ones we know about and planned on doing - what I did not know was how a given diagnostic constrains

the filament models.

All-in-all, I rate this as a highly successful trip.
If your around on Tuesday, we can talk more then - I'll
be taking Monday off.

Mark

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: AS529/%Pol images
Date: Thu, 17 Mar 1994 22:40:15 -0500

Glad to hear we were not snowed out again, though a 2-hr correlator failure is scarcely good news.

I'm not sure about the idea that the problems in %p are all deconvolution, though it is possible that some of them are, because of the differences between CLEAN and UTESS deconvolutions. I will reserve judgement until we have done the test of adding in extra short spacing info simulated from the L Band data as we discussed before you left.

Have a good trip back, and thanks for the update,

A.

From: abridle (Alan Bridle)
To: mswain
Subject: Summer student
Date: Fri, 18 Mar 1994 12:13:24 -0500

Hi Mark,

Just to mention I'm going to have an undergraduate student, Jacob Callcut from Michigan State, working with me this summer. This brings up a couple of points.

Phyllis mentioned that you had rented to some summer students last summer. Will you have any space for rent at your house this summer? (he'll be here from the last week of May until mid-August). If so, I might get you into E-contact with him.

Second is that I'll be away for the last three weeks he'll be here and it might be possible to have him help you quite directly if (a) you're not finished by then -- we need to talk about that contingency in any case, and (b) some "help" with analysis would actually speed you up rather than slow you down. He knows some AIPS already and will know more by then, as I'm going to have him work on some radio galaxy imaging and polarimetry from other projects of mine.

Anyway, think it over.

We should talk about summer strategy and your timescale when you get back anyway. This is just another wrinkle to that ...

A.

From: abridle (Alan Bridle)
To: mswain
Subject: forwarded message from David DeGraff
Date: Tue, 22 Mar 1994 14:07:04 -0500

----- Start of forwarded message -----

Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
id AA13189; Tue, 22 Mar 1994 13:58:20 -0500

Received: from FLORIS.ALFRED.EDU by cv3.cv.nrao.edu (4.1/DDN-DLB/1.13)
id AA07662; Tue, 22 Mar 94 13:58:19 EST

Received: from aucmpsci.alfred.edu by bigvax.alfred.edu (MX V3.3 VAX) with
SMTP; Tue, 22 Mar 1994 13:57:13 EST

Received: from merlin.alfred.edu.aucmpsci by aucmpsci.alfred.edu (4.1/SMI-4.1)
id AA16041; Tue, 22 Mar 94 13:56:36 EST

Received: by merlin.alfred.edu.aucmpsci (4.1/SMI-4.1) id AA07233; Tue, 22 Mar
94 13:56:35 EST

Message-Id: <9403221856.AA07233@merlin.alfred.edu.aucmpsci>

From: david@merlin.alfred.edu (David DeGraff)

To: abridle@NRAO.EDU

Date: Tue, 22 Mar 94 13:56:35 EST

Subject: multifractal code for Mark Swain

Alan-

I've got the code Mark will need to do the multifractal analysis
for 3c353, but I don't have an e-mail address for him.
Could you either send me his e-mail address or have him contact me
so I can send the code? Thanks.

I can't find my notes from the washington meeting. What was the
source you said you would be interested in re-observing with the
full array? Are you still interested?

I hope you got the copy of my thisis ok.

regards

david DeGraff

----- End of forwarded message -----

From: mswain (Mark Swain)
To: abridle
Subject: trip/recomendation
Date: Thu, 12 May 1994 10:35:02 -0400

Alan,

The trip to Rochesters was very productive! I got to talk quite a lot to people in medical imaging and had a couple of interviews as well. The eclipse viewing was good as well.

I also had an interview with Terry Herter at Cornell. He will be advertising for a postdoc position during the next few weeks but based on our interview, I have already applied. The position is "some one to run my KAO observing program." Since the job has not been anounced yet, there is no written description to give to you. The duties of the position are to make sure the groups IR spectrometer works, observe, and help write proposals and papers. There are three people directly involved with the instrument, 1 of whom I know very well. Terry is also interested in developing a project in adaptive optics but funding for that project will not be resolved for two or three months. Anyway, I need a letter of recomendation. Terry's address is:

Cornell University
212 Space Sciences Building
Ithaca, NY 14853

If your interested, I can tell you about the medical imaging interviews on the way back from pizza lunch. Lots of very interesting things going on.

Mark

From: abridle (Alan Bridle)
To: mswain
Subject: L Band
Date: Thu, 19 May 1994 11:30:45 -0400

You mentioned that a million visibilities was high for this dataset on 3C353. From the archive records I have just read in, there were about 750,000 to begin with.

If you are working with a lot less than this now, they may have been time-averaged at some point. Worth checking.

A.

From: mswain (Mark Swain)
To: abridle (Alan Bridle)
Subject: Re: L Band
Date: Thu, 19 May 1994 11:43:28 -0400

I have 446,878 visibilities between A,B and C configs at 1385 MHz. I have checked the history files of A and B configs and if time-averaging was done, it is not recorded. In fact, there is no record of FILLM, AVER, TVAVG, or UVAVG at all.

The "bad" data you saw (with the exception of one 80 Jy point) was created by an amplitude calibration. I am redoing it.

Mark

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: L Band
Date: Thu, 19 May 1994 11:57:23 -0400

OK, the original A config dataset alone has 624,982 records. The B configuration has 110524 records, and the C has 35402. Your total sounds as though either half the A configuration data disappeared, or (more likely) it was averaged to save disk space at some point. FILLM was probably never run on it, as the data were all on EXPORT tapes. These were written on the VLA DEC-10 (long may it R.I.P.).

There is a possibility that early versions of UVAVG did not write .HI files, as it was not written by a regular AIPS programmer (Craig Walker did the first pass).

A.

From: mswain (Mark Swain)
To: abridle
Subject: noise numbers
Date: Wed, 21 Sep 1994 20:07:52 -0400

X band data at 1385 resolution:

- (1) 4.52E-5
- (2) 1.55E-5

X band data w/ addition of short spacing "pseudo X" band data at 1385 res.:

- (1) 3.80E-5
- (2) 2.99E-5

X band V map at 1385 resolution:

- (1) 2.41E-5
- (2) 1.72E-5

- X band data at 1385 resolution means imaging w/ u vrangle = 0,169.
- (1) is an average of the rms from 4 boxes placed N,S,E,W running the length of the source in each respective dimension.
- (2) is an average of the rms from 3 boxes N,S,W but the N and S boxes only extend approx 1/2 length of source (they measure regions located to the west of the core).
- All data are West pointing.

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: noise numbers
Date: Thu, 22 Sep 1994 10:18:43 -0400

Any conclusions?

Any noticeable differences in I images in any other respect?
Rumble, integrated flux, deconvolution success, bowls, etc.?

If neither of the I images suffers from the "<V noise" problem,
does it matter which you use?

Ant significant differences between them when compared with
the L Band data at same resolution -- e.g. spectral index
distributions noticeably different, any more artifacts in
one s.i. image than the other?

If the differences are not noticeable at X and then they probably
will not be at C Band.

From: abridle (Alan Bridle)
To: mswain
Subject: NRL letter
Date: Mon, 17 Oct 1994 17:59:48 -0400

is written. let me know when you're sending your package and I'll
make sure mine follows it by ~24 hrs.

A.

From: aips@ringtail.cv.nrao.edu (AIPS user)
To: abridle@ringtail.cv.nrao.edu
Date: Fri, 28 Oct 1994 10:07:33 -0400

\$ Runfile to define all procedures and adverbs called in MR_353

```
$
proc dadverbs
scalar udi, uvinseq, uvdi, uscrdi, useq, uflux1, uflux2, AVG
scalar vtniter, utniter, vnoise, ura, udec, zlcor, cnum
array ubdi(10), utpr(2), urng(2), keyvall(2), keyval2(2)
string*12 uvinna, uvincls, una
finish
$
$=====
$ definitio of zlclp3
$This procedure averages the mean fluxes of 12 small regions placed
$around the perimeter of 3C353 imaged at 3" resolution on a 2K x 2K
$grid, cellsize .32", w/ core at 1024.72 1026.16, RA 17 17 53.276
$DEC -00 55 49.13. Boxes were chosen based on 3" 1385 MHz image.
$
PROC DZLC1P3
SCALAR SUM,AVG,VARITER,VAR1,VARIENCE,SIGMA,SUM1,SUM2,SUM3,SUM4,SUM5
SCALAR SUM6,SUM7,SUM8,SUM9,SUM10,SUM11,SUM12
FINISH
$
PROC ZLC1P3
SUM=0; AVG=0; VARITER=0; VAR1=0; VARIENCE=0; SIGMA=0; SUM1=0; SUM2=0
SUM3=0; SUM4=0; SUM5=0; SUM6=0; SUM7=0; SUM8=0; SUM9=0; SUM10=0
SUM11=0; SUM12=0
$---East
BLC 519.00 969.00
TRC 539.00 1028.00
IMSTAT
SUM1 = PIXAVG
SUM = SUM + PIXAVG
$
BLC 598.00 1159.00
TRC 615.00 1178.00
IMSTAT
SUM2 = PIXAVG
SUM = SUM + PIXAVG
$
BLC 694.00 1290.00
TRC 730.00 1316.00
IMSTAT
SUM3 = PIXAVG
SUM = SUM + PIXAVG
$---North
BLC 894.00 1346.00
TRC 966.00 1368.00
IMSTAT
SUM4 = PIXAVG
SUM = SUM + PIXAVG
$
BLC 1109.00 1246.00
TRC 1131.00 1266.00
IMSTAT
SUM5 = PIXAVG
SUM = SUM + PIXAVG
```

```

$
BLC 1271.00 1079.00
TRC 1318.00 1155.00
IMSTAT
SUM6 = PIXAVG
SUM = SUM + PIXAVG
$---West
BLC 1487.00 945.00
TRC 1516.00 1040.00
IMSTAT
SUM7 = PIXAVG
SUM = SUM + PIXAVG
$
BLC 1392.00 868.00
TRC 1427.00 890.00
IMSTAT
SUM8 = PIXAVG
SUM = SUM + PIXAVG
$
BLC 1130.00 801.00
TRC 1291.00 829.00
IMSTAT
SUM9 = PIXAVG
SUM = SUM + PIXAVG
$---South
BLC 938.00 781.00
TRC 1105.00 801.00
IMSTAT
SUM10 = PIXAVG
SUM = SUM + PIXAVG
$
BLC 697.00 799.00
TRC 762.00 817.00
IMSTAT
SUM11 = PIXAVG
SUM = SUM + PIXAVG
$
BLC 595.00 868.00
TRC 615.00 884.00
IMSTAT
SUM12 = PIXAVG
SUM = SUM + PIXAVG
$
AVG = SUM/12
VARITER = (SUM1 - AVG) * (SUM1 - AVG)
VAR1 = VAR1 + VARITER
VARITER = (SUM2 - AVG) * (SUM2 - AVG)
VAR1 = VAR1 + VARITER
VARITER = (SUM3 - AVG) * (SUM3 - AVG)
VAR1 = VAR1 + VARITER
VARITER = (SUM4 - AVG) * (SUM4 - AVG)
VAR1 = VAR1 + VARITER
VARITER = (SUM5 - AVG) * (SUM5 - AVG)
VAR1 = VAR1 + VARITER
VARITER = (SUM6 - AVG) * (SUM6 - AVG)
VAR1 = VAR1 + VARITER
VARITER = (SUM7 - AVG) * (SUM7 - AVG)
VAR1 = VAR1 + VARITER
VARITER = (SUM8 - AVG) * (SUM8 - AVG)

```

```

VAR1 = VAR1 + VARITER
VARITER = (SUM9 - AVG)*(SUM9 - AVG)
VAR1 = VAR1 + VARITER
VARITER = (SUM10 - AVG)*(SUM10 - AVG)
VAR1 = VAR1 + VARITER
VARITER = (SUM11 - AVG)*(SUM11 - AVG)
VAR1 = VAR1 + VARITER

VARITER = (SUM12 - AVG)*(SUM12 - AVG)
VAR1 = VAR1 + VARITER
VARIENCE = VAR1/(11)
SIGMA = SQRT(VARIENCE)
TYPE '*****'
TYPE 'Average zero-level off-set =',AVG
TYPE 'Sigma =', SIGMA
FINISH

```

```

From root Fri Oct 28 10:07:44 1994
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
 ["14684" "Fri" "28" "October" "1994" "10:07:43" "-0400" "AIPS user"
 "aips@ringtail.cv.nrao.edu " nil "473" "" nil nil nil "10" nil nil (number " " mark
 " AIPS user Oct 28 473/14684 " thread-indent "\""\n") nil]
 nil)
Received: from ringtail.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
 id AA40064; Fri, 28 Oct 1994 10:07:43 -0400
Received: by ringtail.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
 id AA12847; Fri, 28 Oct 1994 10:07:43 -0400
Message-Id: <9410281407.AA12847@ringtail.cv.nrao.edu>
From: aips@ringtail.cv.nrao.edu (AIPS user)
To: abridle@ringtail.cv.nrao.edu
Date: Fri, 28 Oct 1994 10:07:43 -0400

```

```

$This procedure is an attempt to automate production of 3C353 composit
$deconvolved, "final" images. The steps it does are commented in.
$1) initial hot-spot and core clean removal, make dirty beams for VTESS
$2) vtess deconvolution
$3) rstor clean components from steps (1&2) to VTC image
$4) zero level measure, zero level correction
$5) primary beam correction
$6) puthead to align core to standard frame
$7) hgeom to grid image to standard frame
$8) subim result of (10) to standard size
$
$udi output file disk
$subdi baddisks
$uvinna uv file name
$uvincls uv file class
$uvinseq uvfile seq
$uvdi disk w/ uvdata
$uscrdi scratch disk
$una name for files from automated imaging process
$useq the seq # used during automated sequence
$ura rashift
$udec decshift
$utpr uvtaper
$urng1 inner uvrangle
$urng2 outer uvrangle
$suflux1 flux level to clean to for lobes and core
$suflux2 flux leve to further clean core too

```

```

$vtniter vtess niter
$utniter utess niter
$vnoise vmap noise (used as noise in VT&UT)
$keyvall RA ref pix shift
$keyval2 DEC ref pix shift
$
=====
$          Assign values to adverbs and inputs          $
=====
udi 3
ubdi 0
uvinna '353-W-X-ABCD'
uvincls 'FNLXSC'
uvinseq 1
uvdi 1
uscrdi 4
una 'X_1.3-T'
useq 1
ura 61.5368
udec 2.376
utpr 165,100
urng .75, 204
uflux1 .007
uflux2 .001
vtniter 25
utniter 20
vnoise 7.32E-5
keyvall 0
keyval2 0
save 'mr_353_inputs'
$
$
$*****$
$          "Program" part          $
$*****$
$
$
=====
$ pre-clean I, dirty QU images and IQU beams #1 $
=====
get 'mr_353_inputs'
    task 'mx'
        INNAME      uvinna
        INCLASS     uvincls
        INSEQ       uvinseq
        INDISK      uvdi
        IN2NAME     una
        IN2CLASS    'uvwork'
        IN2SEQ      0
        IN2DISK     uscrdi
        BCHAN       1
        ECHAN       0
        CHANNEL     0
        NPOINTS     1
        CHINC       1
        STOKES      'I  '
        BIF         1
        EIF         2
        OUTNAME     una

```

```

OUTDISK      udi
OUTSEQ       useq
CELLSIZE     .32          .32
IMSIZE       2048        2048
NFIELD       1
FLDSIZE      0
RASHIFT      ura
DECSHIFT     udec
NBOXES       3
box(1,1)     1017.00
box(2,1)     1019.00
box(3,1)     1033.00
box(4,1)     1032.00
box(1,2)     640.00
box(2,2)     935.00
box(3,2)     815.00
box(4,2)     1130.00
box(1,3)     1378.00
box(2,3)     930.00
box(3,3)     1443.00
box(4,3)     1042.00
UVTAPER      utpr
UVRANGE      urng
UVWTFN       ' '
UVBOX        0
ZEROSP       0
XTYPE        5
YTYPE        5
XPARM        0
YPARM        0
GAIN         .001
FLUX         uflux1
MINPATCH    1024
NITER        100000
BCOMP        0
BMAJ         -1
BMIN         1.3
BPA          0
PHAT         0
FACTOR       -.5
DOTV         -1
CMETHOD    ' '
GUARD        -1,-1
MAXPIXEL     0
BADDISK      ubdi
go mx                $clean hot-spots and core
wait mx
indi udi
inna una
inclass 'icln'
inseq useq
keyword 'niter'
geth                $find number of cc for restart
tget mx
niter 100000
bcomp keyvalue(1)
nboxes 1
flux = uflux2
go mx                $clean core some more

```



```

wait mx
  get 'mr_353_inputs'
  inna una
  inclass 'icln'
  inseq useq
  indi udi
  outna una
  outclass 'vticln'
  outseq useq
  outdi udi
go rename                               $rename icln to vticln
  inna una
  inclass 'ibeam'
  inseq useq
  indi udi
  intype 'ma'
zap                                       $zap old ibem
  recat
  tget mx
  niter 0
  bcomp 0
go mx                                     $make dirty ibeam for VT
  wait mx
  inna una
  inclass 'ibeam'
  inseq useq
  indi udi
  outna una
  outclass 'vtibem'
  outseq useq
  outdi udi
go rename                               $rename ibeam to vtibem
  tget mx
  stokes 'q'
$go mx                                    $make dirty Q map and beam
  wait mx
  stokes 'u'
$go mx                                    $make dirty U map and beam
  wait mx
$=====
$                                     VT and UT deconvolution                                     $
$=====
get 'mr_353_inputs'
  task 'vtess'
    INNAME      una
    INCLASS     'VTICLN'
    INSEQ       useq
    INDISK      udi
    IN2NAME     una
    IN2CLASS    'VTIBEM'
    IN2SEQ      useq
    IN2DISK     udi
    IN3NAME     '      '
    IN3CLASS    '      '
    IN3SEQ      0
    IN3DISK     uscrdi
    OUTNAME     una
    OUTCLASS    'VT  '
    OUTSEQ      useq

```

```

OUTDISK      udi
OUT2NAME     una
OUT2CLAS     'VTC  '
OUT2SEQ      useq
OUT2DISK     udi
NMAPS        1
NITER        vtniter
NOISE        vnoise
FLUX         0
BLC          0
TRC          0
DOTV         -1
PRTLEV       1
PBSIZE       0
BMAJ         1.3
BMIN         1.3
BPA          0
BADDISK      ubdi
go vtess          $stokes I MEM
  wait vtess
  recat
  tget vtess
  task 'utess'
    inclass 'qmap'
    in2class 'qbeam'
    outclass 'qt'
    out2clas 'qtc'
$go utess          $stokes Q MEM
  wait utess
$  recat
  tget utess
    inclass 'umap'
    in2class 'ubeam'
    outclass 'ut'
    out2clas 'utc'
$go utess          $stokes U MEM
  wait utess
$  recat
$=====
$  restor pre-cleaned cc to VTC image  $
$=====
get 'mr_353_inputs'
  inna una
  inclass 'vticln'
  inseq useq
  indi udi
  keyword 'niter'
geth          $determine number of cc to rstor
  task 'rstor'
    niter = keyvalue(1)
    INNAME      una
    INCLASS     'VTC  '
    INSEQ       useq
    INDISK      udi
    BLC         0
    IN2NAME     una
    IN2CLASS    'VTICLN'
    IN2SEQ      useq
    IN2DISK     udi

```

```

INVERS      0
OUTNAME     una
OUTCLASS    'RSTOR '
OUTSEQ      useq
OUTDISK     udi
$NITER      cnum
BMAJ        1.3
BMIN        1.3
BPA         0
BADDISK     ubdi
    type 'restoring',niter,' clean comp.'
go rstor          $rstor clean comp.
    wait rstor
$=====$
$    determine and apply zero level correction    $
$=====$
$get 'mr_353_inputs'
    inname una
    inclass 'rstor'
    inseq useq
    indi udi

zlclp3          $determine zerl level correction
    type avg
    aparm(3) = -avg
    type aparm(3)
    task 'comb'
        INNAME      una

        INCLASS     'rstor'
        INSEQ        useq
        INDISK       udi
        IN2NAME      una
        IN2CLASS     'rstor'
        IN2SEQ       useq
        IN2DISK      udi
        DOALIGN      1
        OUTNAME      una
        OUTCLASS     'ZLCRST'
        OUTSEQ       useq
        OUTDISK      udi
        BLC          0
        TRC          0
        OPCODE       'sum'
        aparm 0
        APARM(1)    1
        aparm(2)    1E-30
        BPARM        0
        opcode      'sum'
        aparm(3) = -avg
    type 'Adding', aparm(3), 'to im to correct zero level offset.'
go comb          $apply zero level correction
    wait comb
$=====$
$    apply primary beam correction    $
$=====$
get 'mr_353_inputs'
    task 'pbcor'
        USERID      0
        INNAME       una

```

```

        INCLASS      'ZLCRST'
        INSEQ        useq
        INDISK       udi
        BLC          0
        TRC          0
        OUTNAME      una
        OUTCLASS     'PBCZLC'
        OUTSEQ       useq
        OUTDISK      udi
        DPARM        0
        GPOS         0
go pbcor                $pbcor I image
    wait pbcor
    tget pbcor
        inclass 'qtc'
        outclass 'pbcqtc'
$go pbcor                $pbcor Q image
    wait pbcor
        inclass 'utc'
        outclass 'pbcutc'
$go pbcor                $pbcor U image
    wait pbcor
$=====
$          puthead to set IQU image RA&DEC          $
$=====
get 'mr_353_inputs'
    task 'subim'
        USERID      0
        INNAME       una
        INCLASS      'PBCZLC'
        INSEQ        useq
        INDISK       udi
        OUTNAME      una
        OUTCLASS     'pthpbi'
        OUTSEQ       useq
        OUTDISK      udi
        BLC          0
        TRC          0
        XINC         1
        YINC         1
        OPCODE       '  '
go subim                $copy I image
    wait subim
    tget subim
        inclass 'pbcqvt'
        outclass 'pthpbq'
$go subim                $copy Q image
    wait subim
    tget subim
        inclass 'pbcuvt'
        outclass 'pthpbu'
$go subim                $copy U image
    wait subim
    task 'puth'
        inna una
        inclass 'pthpbi'
        inseq useq
        indi udi
        keyword 'CRPIX1'

```

```

puthead      keyvalue keyval1
              $puthead I RA
              keyword 'CRPIX2'
              keyvalue keyval2
puthead      pixxy 1025,1025 $puthead I DEC
maxfit       $check
              type 'should be: '
                inclass 'pthpbq'
                inseq useq
                indi udi
                keyword 'CRPIX1'
                keyvalue keyval1
$puthead     $puthead Q RA
              keyword 'CRPIX2'
              keyvalue keyval2
$puthead     $puthead Q DEC
              inclass 'pthpbu'
              inseq useq
              indi udi
              keyword 'CRPIX1'
              keyvalue keyval1
$puthead     $puthead U RA
              keyword 'CRPIX2'
              keyvalue keyval2
$puthead     $puthead U DEC
$=====
$           hgeom IQU images onto same grid           $
$=====
get 'mr_353_inputs'
  task 'hgeom'
    INNAME      una
    INCLASS     'pthpbi'
    INSEQ       useq
    INDISK      udi
    IN2NAME     '353W-X/L2  '
    IN2CLASS    'ZLCRST'
    IN2SEQ      2
    IN2DISK     3
    OUTNAME     una
    OUTCLASS    'hgmphi'
    OUTSEQ      useq
    OUTDISK     udi
    BLC         0
    TRC         0
    IMSIZE     0           0
    APARM       0           1
go hgeom      $grid I image
  wait hgeom
  tget hgeom
    inclass 'pthpbq'
    outclass 'hgmphq'
$go hgeom    $grid Q image
  wait hgeom
  tget hgeom
    inclass 'pthpbu'
    outclass 'hgmphu'
$go hgeom    $grid U image
  wait hgeom

```

```

$=====
$                subim final IQU images                $
$=====
get 'mr_353_inputs'
  task 'subim'
    USERID      0
    INNAME      una
    INCLASS     'hgmphi'
    INSEQ       useq
    INDISK      udi
    OUTNAME     una
    OUTCLASS    'SBMH_I'
    OUTSEQ      useq
    OUTDISK     udi
    BLC         536          794
    TRC         1491        1361
    XINC        1
    YINC        1
    OPCODE      '  '
go subim                $subim I image
  wait subim
  tget subim
  inclass 'hgmphiq'
  outclass 'sbmh_q'
$go subim                $subim Q image
  wait subim
  tget subim
  inclass 'hgmphiu'
  outclass 'sbmh_u'
$go subim                $subim U image
  wait subim
$#####

```

```

From abridle Thu Nov 3 13:18:32 1994
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
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nil "21" "CALIB A&P normalization" nil nil nil "11" nil nil (number " " mark "
Alan Bridle Nov 3 21/848 " thread-indent "\"CALIB A&P
normalization\""\n") nil]
  nil)
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
  id AA48177; Thu, 3 Nov 1994 13:18:31 -0500
Message-Id: <9411031818.AA48177@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: mswain
Subject: CALIB A&P normalization
Date: Thu, 3 Nov 1994 13:18:31 -0500

```

Mark,

The bug has been found. Whenever you A&P calibrated a dataset with several sub-arrays (e.g. as when calibrating a DBCON'd dataset from more than one configuration), the amplitude gain normalization from the last sub-array was being applied to all of them. Eric has fixed this in TST. To do A&P calibration correctly on datasets with multiple sub-arrays you must therefore convert to the new AIPS

file format (D) and run from TST.

Single-array calibration was being done correctly in OLD and NEW, and may still be done there.

The problem was noticed from the SNPLTs in a case where the last sub-array had some particularly large corrections. If you have checked your amplitude gain SNPLTs for multiple-array A&P amp calibrations and have seen no significant problems, then the effects on your data so far will have been small.

Alan

```
From abridle Thu Dec 1 15:28:56 1994
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
  ["5756" "Thu" "1" "December" "1994" "15:28:54" "-0500" "Alan Bridle" "abridle "
  nil "115" "forwarded message from Wil van Breugel" nil nil nil "12" nil nil (number
  " " mark " Alan Bridle Dec 1 115/5756 " thread-indent "\"forwarded
  message from Wil van Breugel\""\n") nil]
  nil)
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
  id AA50103; Thu, 1 Dec 1994 15:28:54 -0500
Message-Id: <9412012028.AA50103@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: mswain
Subject: forwarded message from Wil van Breugel
Date: Thu, 1 Dec 1994 15:28:54 -0500
```

```
----- Start of forwarded message -----
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
  id AA22259; Thu, 1 Dec 1994 15:11:38 -0500
Received: from igpp.llnl.gov by cv3.cv.nrao.edu (4.1/DDN-DLB/1.13)
  id AA29807; Thu, 1 Dec 94 15:11:10 EST
Received: from sundial.llnl.gov by igpp.llnl.gov (4.1/LLNL-1.19)
  id AA20245; Thu, 1 Dec 94 11:59:59 PST
Received: by sundial.llnl.gov (4.1/LLNL-1.18)
  id AA00603; Thu, 1 Dec 94 12:07:11 PST
Message-Id: <9412012007.AA00603@sundial.llnl.gov>
From: wil@sundial.llnl.gov (Wil van Breugel)
To: adv@igpp.llnl.gov
Subject: POSTDOCTORAL POSITIONS
Date: Thu, 1 Dec 94 12:07:11 PST
```

Dear colleague, we would appreciate if you could bring the attached advertisement to the attention of interested candidates. Thank you for your help.

Wil van Breugel, wil@sundial.llnl.gov

POSTDOCTORAL POSITIONS IN ASTROPHYSICS

University of California
Institute of Geophysics and Planetary Physics
Lawrence Livermore National Laboratory

The Institute of Geophysics and Planetary Physics (IGPP) at Lawrence Livermore National Laboratory (LLNL) anticipates having several postdoctoral positions available in its astrophysics program starting in the fall of 1995.

Successful candidates will be expected to conduct a vigorous and significant program of independent research. Applicants' fields of research may be in any area of astrophysics: observational, theoretical, computational, or experimental. Areas being pursued by IGPP and LLNL staff include high energy astrophysics, plasma astrophysics, nuclear and particle astrophysics, star formation and stellar evolution, X-ray binaries, galactic radio and infrared studies, galaxy formation and evolution, active galactic nuclei, extra-galactic radio sources, and cosmology.

Major

projects currently underway at IGPP/LLNL are:

- 1) Ground- and space-based observational studies of various radio source populations at optical and near-IR wavelengths, including imaging- and spectro-polarimetry of high redshift radio galaxies and quasars, and optical/near-IR/mm-line (CO) observations of ultraluminous far infrared galaxies and quasars (Wil van Breugel);
- 2) The development of adaptive optics and laser guide star systems for use at the Lick and Keck observatories, which will allow to correct for atmospheric seeing effects (Claire Max);
- 3) Searches for dark matter (Massive Compact Halo Objects - MACHO's) at Mount Stromlo Observatory (Australia) using novel large field of view optics and large format CCD's (Charles Alcock);
- 4) Variable star studies using two-color information with detailed time-baseline information from the MACHO-team data base (Kem Cook);
- 5) The FIRST (Faint Image of the Radio Sky at 21 cm) all sky radio survey with the Very large Array (B-configuration) which will provide a catalog of millions of radio sources for comparison with surveys in other wavebands (Bob Becker, UC Davis).

Postdoctoral fellows at IGPP will have access to LLNL's unique resources including supercomputers, the facilities of LLNL's Laboratory for Experimental Astrophysics (LEA), Lick Observatory and, in collaboration with IGPP staff members or UC faculty, Keck Observatory. IGPP also supports research with a 10 micron imaging camera at LEA and with an automated fiber-fed multi-object spectrograph designed and built at LEA in collaboration with UC Santa Cruz faculty.

We especially encourage candidates to apply with interest in the following areas:

- - imaging, spectroscopy, and spectro-polarimetry at optical and infrared wavelengths of high redshift radio galaxies and quasars,
- - optical, infrared, and mm-line (CO) observations of ultraluminous far infrared galaxies and quasars,
- - Galactic and extra-galactic infra-red spectroscopy,
- - cosmology, including particle and nuclear astrophysics, and galaxy formation/evolution,
- - adaptive optics,
- - experimental dark matter searches.

IGPP has a large network of SUN workstations and access to LLNL's supercomputer and image processing facilities. All major astronomical image analysis programs are available. In a joint effort with UC Davis faculty

software is being developed for fast and flexible analysis of large astronomical catalogs. The IGPP hosts collaborators from all campuses of University of California and has an extensive postdoctoral and visitor program.

The IGPP postdoctoral appointments will be for 1-3 year terms. Salary and fringe benefits are very competitive, and adequate travel support will be made available. Applications may be made at any time, but serious consideration of candidates will commence 1 JANUARY 1995. Applicants should send their curriculum vitae, bibliography and a description of their planned research program to Dr. Wil van Breugel, Institute of Geophysics and Planetary Physics, Lawrence Livermore National Laboratory, 7000 East Ave, P.O. Box 808, L-413, Livermore, CA 94550. They should also arrange for three letters of recommendation to be sent to this same address. A copy of the application material should be send to Alison Bradley-Carver, Recruiting and Employment Division, Lawrence Livermore National Laboratory, P.O. Box 5510, L-275, Dept.AJPTB14AB, Livermore, CA 94551.

For further information please contact Dr. Wil van Breugel at IGPP, Phone (510)-422-7195, FAX (510)-423-0238, or by email (Internet): wil@sundial.llnl.gov.

----- End of forwarded message -----

From mswain Sat Dec 17 14:22:22 1994
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
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"12" nil nil (number " " mark " R Mark Swain Dec 17 11/453 " thread-
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nil)
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
id AA28051; Sat, 17 Dec 1994 14:22:21 -0500
Message-Id: <9412171922.AA28051@polaris.cv.nrao.edu>
From: mswain (Mark Swain)
To: abridle
Subject: Jansky Fellowship
Date: Sat, 17 Dec 1994 14:22:21 -0500

Alan,

I did not apply for the Jansky fellowship this year because of unwritten guideline of discriminating against grad students from the NRAO. Late yesterday, I learned that this guideline was just recently explicitly removed. I asked Ken if there was anything I could do and he recommended I talk to you, talk to Bob, and see if I could apply late. Do you think that is a good idea, would you support it, or should I put up and shut up?

Mark

From: mswain (Mark Swain)
To: abridle
Subject: Jansky Fellowship
Date: Mon, 19 Dec 1994 13:15:06 -0500

Alan,

I have decided to apply for the Jansky Fellowship. The deadline for letters of recommendation is Dec. 31. Also, I am applying again for the SMA position which has a Jan 15 deadline. I will leave a xerox copy of the add in your box.

BTW, will away from C'ville for any extended period during Jan, Feb, Mar or April? My goal is to defend during the first week in April.

Mark

From: mswain (Mark Swain)
To: abridle
Subject: holiday schedule
Date: Wed, 21 Dec 1994 08:24:12 -0500

Alan,

I am leaving town tomorrow and will return by
Jan. 2nd.

Mark

From: mswain (Mark Swain)
To: abridle
Subject: reference
Date: Mon, 2 Jan 1995 21:49:57 -0500

If it is not much trouble, can you give me
the references for Laing and Garrington
concerning the Laing-Garrington effect?

Mark

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: reference
Date: Mon, 2 Jan 1995 22:47:09 -0500

Hi Mark,

They are in the ref list for the big quasar paper
that you have the preprint of.

Thanks for bringing the car back to NRAO. I
have collected the key. I believe Mary's
problem is just a side-effect from the chemotherapy
and not a full-blown emergency. Will know more in the
morning. I'll probably be in at about the usual time
but may have to take a trip down to the hospital in
the a.m. to talk to her docs or/and bring her home if
she's doing better.

]]

A.
s

From: abridle (Alan Bridle)
To: mswain
Subject: movements
Date: Tue, 3 Jan 1995 21:26:35 -0500

Hi Mark,

I had to be back and forth from the hospital a lot yesterday, you had left by the time I tried to check in with you. Tomorrow will be much of the same, so leave me an E-mail if you have anything urgent for me!

We still don't know for sure what Mary's new problem is, but most of the very bad possibilities have been eliminated. They are doing some more tests tomorrow and I will need to be there on and off much of the day as M. is heavily sedated and not able to interact with the docs very much at all.

A.

From: mswain (Mark Swain)
To: abridle
Subject: letters
Date: Mon, 9 Jan 1995 21:01:41 -0500

Alan,

I have left xeroxes of the AAS job registrar pages which contain postdoc positions I am applying for. I have also left a set of pre-addressed envelopes. Deadlines range from Jan 15 to Jan 30.

I hope Mary is doing well.

Mark

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: letters
Date: Tue, 10 Jan 1995 00:04:26 -0500

OK I'll be in some time tomorrow and will pick them up.

Mary has had another operation (last Wednesday) but is recovering o.k. I am not sure when she will be leaving the hospital but in any case it will be several more days before she is able to take care of herself.

A.

From: abridle (Alan Bridle)
To: mswain
Subject: Bridle's last draft
Date: Tue, 31 Jan 1995 17:59:02 -0500

```
\documentstyle[12pt]{article}
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\addtolength{\topmargin}{-.75in}
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\tolerance=10000
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%\input lastro.tex
%
\newcommand{\arcmin}{\hbox{$^{\prime}$}}
\newcommand{\arcsec}{\hbox{$^{\prime\prime}$}}
\newcommand{\farcs}{\hbox{$.!\!'\!^{\prime\prime}$}}
\newcommand{\degree}{^{\circ}}

\begin{center}
{\bf J2146+82 - A Large Radio Galaxy With Misaligned Outbursts?}
\end{center}
\begin{center}
Bill Cotton (NRAO-CV), Mark Swain (Univ. of Rochester, NRAO-CV),

Alan Bridle (NRAO-CV) \& Namir Kassim (NRL)

\end{center}

\vspace{.5in}
```

We propose a mix of high and low-resolution observations of the unusually large NVSS source J2146+82 ($S_{1400} \sim 0.42$ Jy). We require high-resolution data to explore how much of the unusual structure in this field may be part of a single, complex radio source. We also wish to determine the total extent, spectral and polarimetric properties of the diffuse components of what may be a large radio galaxy exhibiting distinct ejection axes at different epochs.

The J2146+82 field (Fig.1) is one of the more remarkable radio complexes revealed by the NVSS. Two extended, elongated lobes containing about 0.4 Jy span about $\{20\text{\arcmin}\}$ across a compact 10-mJy source (C). At this point it is not clear that C is the ``core'' of this extended structure, though its location and alignment with the ridge-line of the southern lobe clearly suggest this.

The POSS prints show a group of 17-19 magnitude objects within $\{15\text{\arcsec}\}$ of (C). Three are red and diffuse, probably elliptical galaxies. The brightest galaxy is within $\{5\text{\arcsec}\}$ of the NVSS position for the peak of C. The fourth object is neutral in color and looks stellar. The accuracy of the NVSS position should be about $\{2\text{\arcsec}\}$ but if C is a blend of ``core'' and jet emission it need not coincide exactly with the optical identification in any case. If

C is identified with the brightest galaxy, its redshift is likely to be >0.1 and might plausibly be as high as 0.3 (based on apparent magnitudes roughly estimated from the two POSS prints). If C proves not identified with this galaxy, its redshift may be even higher, of course.

If an association between the extended lobes and C can be confirmed, the projected linear size of the extended structure would be >1.5 Mpc (even by a conservative estimate using $z > 0.1$ and $H_0 = 100$) and perhaps as high as 3.3 Mpc for $z = 0.3$, which could place J2146+82 among the largest known extragalactic sources. (There are no conspicuously brighter galaxies within the radio structure with which the lobes might be identified to invalidate this conclusion even if C proves not to be connected to the lobes). The 1.4-GHz radio luminosity would be between 5×10^{24} and 5×10^{25} W Hz⁻¹. This luminosity range is consistent both with the observed edge-brightening of the radio lobes and with their imputed large size---at 1.4 GHz, edge-brightened lobes are common only above 5×10^{24} W Hz⁻¹, and radio sources larger than 1 Mpc are common only in a relatively narrow range of powers, from 10^{24} to 10^{26} W Hz⁻¹.

The J2146+82 field merits attention not only as a possible new example of a large radio galaxy, but also because it contains a significant excess of other radio sources. If this excess is anything other than an accident, the relationship of the other sources to the large lobes and to C is especially intriguing.

Sources A and B, both either extended or double, are also arranged quite symmetrically about C. This configuration is either an accident or an instance of activity in the parent on an axis misaligned with the rest of the source. From the 1.4-GHz source counts, we estimate the probability of finding the alignment and symmetry of features A and B around C randomly among the several thousand NVSS fields routinely inspected by Cotton as only $\sim 6 \times 10^{-3}$.

We therefore wish to image J2146+82 further to explore whether any or all of the additional sources can be related as parts of the same radio structure or as a chance superposition of independent sources. Any evidence that this grouping is not accidental will make J2146+82 a prime target for testing models of large, long-lived radio sources and possibly also of recurrent activity in such sources.

We want to explore the following possibilities.

{\it Are there flat-spectrum sub-arc-second components within any of the radio features that could identify them as independent sources?} We expect to find such a component at C if this is indeed the ``core'' of a radio galaxy associated with the POSS candidates, and its position should test this identification. Any other flat-spectrum compact components, e.g. in A, B or D would eliminate that object as part of structure directly produced by C. Steeper-spectrum compact emission in these features might however signify hot spots in radio lobes, which could add to evidence for physical association with the other structures. We ask for 2 hours of A configuration time at X band and C band to explore these possibilities, and to test whether there is a small-scale jet or jets originating from C, and if so in which direction.

{\it Are there low-level diffuse features that could show which of

these features might be physically connected to C?} Both the morphology and spectral gradients in the most extended structure could give clues to the permissible evolutionary connections between the lobes, A, B and C, e.g. is there any spectral evidence that the lobes are older than any extended emission along the A-B-C axis? The most sensitive searches for diffuse, possibly steep-spectrum emission can be done in the D configuration at L Band and at P Band. To look for systematic spectral gradients we also propose a scaled-array series, using a D configuration mosaic at C Band, the C configuration at L Band and the B configuration at P Band. This series will further be used to examine the depolarization of the lobes. The percentage polarizations of the north and south lobes at 1.4 GHz are 16% and 10% respectively but the E-vectors are quite well-organized, so the lobes may be becoming Faraday thick by ~ 1 GHz. We will use these scaled-array data to look for any depolarization asymmetry between the lobes (including the P Band data if we can calibrate out relative changes in the apparent position angles through the observing run due to ionospheric Faraday rotation).

{\it Is there a large-scale jet in either the extended radio lobes or along the A-B-C axis whose path could test whether C is their parent?} Whatever the relationship to other sources in the field, the lobes are part of a large source with a low-prominence core. We should expect this source to be near the plane of the sky and thus exhibit two weak or no radio jets rather than one prominent jet, on the standard models for sources with $\sim 10^{25}$ W Hz $^{-1}$ at 1.4 GHz. We will anticipate this by searching for any large-scale jet(s) at a resolution and frequency that discriminates against the more diffuse, steep-spectrum emission of the lobes but will not over-resolve any weak extended jet emission with an $\alpha \sim 0.6$ spectrum. We will combine a C configuration observation at C Band with the proposed D configuration data to make a higher-resolution mosaic. This image should also help to clarify relationships between the extended structures and any fine structure revealed by the A configuration observations.

Note that if we were to find an asymmetric, prominently one-sided jet or a jet-correlated depolarization asymmetry in this source, the standard models (Laing 1988, Garrington

{\it et al.} 1988, 1991) would ask that the source be oriented towards our line of sight, increasing the imputed size. So if our expectation of a {\it weak} jet system proves to be incorrect, we could acquire good evidence for a {\it very} large radio source!

Finally, we note that Source D is also brighter and closer to the others than would be expected randomly from the source counts alone (probability again less than 1% within the sample scrutinized by Cotton). A radical alternative interpretation of the excess of sources near J2146+82 would be that A is indeed unrelated to the others, but that D and B are a gravitationally-lensed image of the main source. Such ~ 4 arcmin "image splitting" would require a cylindrical lens with a large linear mass density $\sim 10^{15} M_{\odot} \text{ Mpc}^{-1}$, comparable to the average expected in a supercluster (Sanders {\it et al.} 1984). Without evidence for foreground galaxies, this interpretation is highly speculative. But because such imaging would not change the radio surface brightnesses, only the apparent image scales, it is easily tested by determining the relative surface brightnesses of putative

``corresponding' features in B+D and in the main source at higher angular resolution than in Figure 1. Our proposed intermediate-resolution observations will allow this test as a ``free spin-off'' from the rest of the study.

We therefore request the following VLA configurations and frequencies:

A array: 2 hours to search for fine structure in and around C and each of the small-diameter sources in the field at both C and X bands, to assess whether there are independent parent objects for any of them and to determine the orientation of any small-scale jet(s) near C.

B array: 4 hours at P Band to sample intermediate spatial scales in the lobes for spectral and depolarization imaging.

C array: 4 hours divided between C and L Band, the former primarily to search for large-scale jets and other lobe fine structure that may help establish relationships between sources in the field morphologically, the latter primarily to search for signs of spectral evolution and depolarization.

D array: 2 hours to sample short spacings at C, L and P bands, best done near lower culmination for maximum sensitivity to the most extended (and likely steepest-spectrum) emission.

\vspace{.25in}

\begin{center}

References

\end{center}

\vspace{.25in}

\noindent{Garrington, S.T., Leahy, J.P., Conway, R.G. \& Laing, R. A. 1988, Nature, 331, 147.}

\noindent{Garrington,S.T., Conway, R.G. \& Leahy, J.P. 1991, M.N.R.A.S. 250, 171.}

\noindent{Laing, R.A. 1988, Nature, 331, 149.}

\noindent{Sanders, R.H., van Albada, T.S. \& Oosterloo, T.A. 1984, Ap.J. 278, L91.}

\end{document}

\special{psfile= J2146+82cntr.ps hoffset=575 voffset=-300 hscale=85 vscale=85 angle=90}

From: abridle (Alan Bridle)
To: mswain
Subject: One typo
Date: Tue, 31 Jan 1995 18:01:45 -0500

Delete the ?? after the 15\arcsec in para.3, line 1
in file as sent.

A.

From: mswain (Mark Swain)
To: abridle
Subject: last 3 weeks
Date: Wed, 21 Jun 1995 17:29:20 -0400

Alan,

I have taken most of the past 3 weeks off to do some major work on our house. We had two major floods back-to-back and our previous stop-gap measures to prevent flooding were being overwhelmed.

My job at Simpson Weather Associates is nominally 1/4 time which I think will allow me to continue to make progress on my thesis.

If your around, early next week would be a good time for us to talk since I might have gotten some work done by then. I'm currently working on the observe file for our project with Bill. Hope your trip to Socorro was went well.

Mark

From: mswain@truchas.cv.nrao.edu (Mark Swain)
To: abridle
Date: Tue, 5 Sep 95 16:02:55 EDT

Outline

(see end for abbreviations)

JETS:

General Jet/Counterjet characteristics

- ~1% source flux at C band
(any wavelength dependence will be specified)
- miss alignment of initial axes
~6 degrees
- Jet/Counterjet arm length ratios
~0.75
- Jet/Counterjet (J/CJ) relative surface brightness
~2:1
- Jet mostly straight and traceable into hot spot
- CJ has at least 1 bend fairly early on
- CJ not traceable into either West lobe hot spot candidate
CJ bends ~180 deg. if the northern West lobe hot spot
candidate steep gradient section is the ``working surface.''
- bright knots within jet and bright segment in CJ
knots at beginning and end of jet straight segment
(0.4 arcsec picture or contour plot - possibly a Sobel
filter image). These oblique features are inclined to the
jet axis by ~45 degrees.
- very low intrinsic polarization for J or CJ
give integrated polarized intensity limits for J&CJ
as well as integrated POLI slice limits for J&CJ
- polarization minima features border jet (rails)
look at picture
- cocoon of material around jet in both I and POLI

Jet and Counterjet Profile Shapes

- integrated independent transverse slices along jet
-emission excess (cocoon) very apparent
- jet total I profile shape either flat-topped or edge-brightened
-1,2, and 3 Gauss comp. fit results
-would be nice to have model to fit
- CJ total I profile
-(not been done yet because there is little to work w/)
-main question: is CJ profile qualitatively similar to J profile?
- POLI jet profiles seem to mostly have no jet emission
-show plot (avg. ambient POLI vs. POLI between rails)
-polarized jet emission is present at knots at beginning and
end of straight jet segment.

The Rails

- rails ~0.4 arcsec wide (measured from 0.4 arcsec res. images)
- rails ~ 2.5 arcsec center-to-center separation
- frequency dependence of rail position?
-seems to be no systematic difference but should know better soon.
- rail depth estimated by extrapolating surrounding emission
- rails depth does not correlate w/ frequency
-show plot
-means rails not a Faraday depolarization effect

- rail depth correlates with ambient polarized position angle
- frequency dependence of this correlation?
- North and South rail different?
- suggests rails caused by cancelation of ambient polarized emission from emission in a thin sheath around the jet in which the B field has been sheared. Limb brightening then causes the rails.
- can the above model work quantitatively?

The Cocoon

- seen in both total I and POLI for Jet
- complex profile
- width varies by a factor of ~2 (total I)
- width variation in POLI?
- cocoon not detected for CJ (still true?)
- J-cocoon/CJ-cocoon limits
- can only do total I because of POLCO blanking
- can CJ-cocoon non-detect be ascribed to a J/CJ brightness ratio difference in the J & CJ cocoons?
- is J-cocoon spix jet-like or lobe-like?
- is there a systematic % polarization gradient?

Jet knots

- don't appear to be regions of changes in opening angle
- impose local order of jet B field
- width of this event?
- position of jet POLI max. in relation to feature?

Jet and Counterjet Opening Angle

- jet width by position of two Gaussians fit to total I slice regions
- lobe and cocoon emission corrected
- shows expansion and contraction
- opening angle ~2.2 degrees extrapolates back to core
- after ~50 arcsec jet opening angle ~-2.2 degrees
- same results with single component Gaussian fitting
- jet width by position of rails at slice regions
- rails have relatively constant width
- show plot of jet width by 2 Gaussian and rail position
- CJ width by single component Gaussian fit
- same initial opening angle as jet
- no evidence for change in opening angle along length of CJ
- couldn't use rail position to measure CJ width
- conclusion: depends on what constitutes the jet.
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- typical bright filament properties
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 - try structure functions to measure presence of multiple scales
 - could a width-emissivity relation be constructed for filaments and subfilaments?
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- spix of fil same as spix of lobe (to 1st order)
- show spix map
- fil prominence ($(\text{grad } I)/I$) appears independent of location (make quantitative) but fil length shortens (make quantitative)
- is this only true of East lobe?
- do other fil properties (width, brightness, %pol, etc...) correlate w/ ambient properties
 - slice and stack for average fil profile
 - correlations of fil properties w/ lobe edge steepness

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 - depth as function for freq.
 - no interposed optical object detected
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- other dark regions
 - look at bright-dark feature crossings

- integrate profile of dark features
- try to answer questions: are these dark regions actual features with properties or merely an absence of emission.

What the Filament Models Predict

- discuss major models (Tribble, Eliek, Dal Pino, etc...)
- some models predict dark filaments
- all models predict or imply spectral differences between lobe and filaments

LOBES

Lobe Properties

- small amount of Faraday Rotation
- Faraday rotation map
- depolarization features in Faraday screen
- dominant spix feature is well organized gradient
- orientation of spix gradient
- length scale over which gradient dominates any spix change

What Lobe Spectral Aging Models Predict

- present standard spectral aging models
- JP, KP, Tribble
- color-color diagrams for spectral aging models

Conclusions for Filaments and Lobes

- necessarily sketchy at this point
- current fil models do not describe 3C353
- models predict fil w/ different spix from lobes
- current spectral aging models don't work for 3C353
- UCL band color-color plot too steep
- hope to discuss but no specifics yet
- particle diffusion
- equipartition
- implications of large scale spectral gradient
- connections between fil and hot spot

HS = hot spot

J = jet

CJ = counter jet

POLI = polarized intensity

total I = total intensity

rail(s) = polarization minima boarding the jet

spix = spectral index

POLCO = polarized intensity correction because of the Ricean bias

pol = polarization

fil = filament

From: abridle (Alan Bridle)
To: mswain
Subject: Two general comments
Date: Wed, 6 Sep 1995 09:45:41 -0400

I have a number of detailed ones, but here are a couple of larger-scale questions you might want to consider before the phone meeting (when?):

1. The outline as it stands is a smorgasbord of phenomena, probably too rich and too many to be digested in the time available before January. It needs a stronger physical focus to narrow it down. You should pick about half-a-dozen physical questions and concentrate on the things that are needed to answer them. Could you think about that before we talk on the phone? Otherwise we may just wander.

2. The "rail effect" focuses attention on the issue of the intrinsic magnetic configurations in the source, i.e. on degrees of polarization (orderliness) and on the de-rotated position angle distributions throughout the lobes. I think you should plan to derive a B-field image for the lobes so that you can describe the basic magnetic configuration within which the jet/cocoon phenomena are embedded. This will come naturally from Faraday RM analysis, which we now know you can't avoid while modeling the "rails"!

A.

From: mswain@truchas.cv.nrao.edu (Mark Swain)
To: abridle
Date: Wed, 6 Sep 95 13:53:00 EDT

Record for tape ImageMaster.2
(tape w/ 60 files given to Alan 6Sep95)

	OL1/X_1.3	.SBMH_I.	10 MA \	
	OL1/X_1.3	.SBMH_Q.	10 MA	
	OL1/X_1.3	.SBMH_U.	10 MA	
	N2L2/X_1.3	.SBMH_I.	10 MA	1.3 arcsec image set with X band
	N2L2/X_1.3	.SBMH_Q.	10 MA	inner u-v coverage
	N2L2/X_1.3	.SBMH_U.	10 MA	
	C/X_1.3	.SBMH_I.	10 MA	
	C/X_1.3	.SBMH_Q.	10 MA	
	C/X_1.3	.SBMH_U.	10 MA	
10	X_1.3	.SBML_I.	10 MA	
	X_1.3	.SBML_Q.	10 MA	
	X_1.3	.SBML_U.	10 MA /	
	OL1/U_1.3	.SBMH_I.	10 MA \	
	OL1/U_1.3	.SBMH_Q.	10 MA	
	OL1/U_1.3	.SBMH_U.	10 MA	
	N2L2/U_1.3	.SBMH_I.	10 MA	
	N2L2/U_1.3	.SBMH_Q.	10 MA	1.3 arcsec image set with U band
	N2L2/U_1.3	.SBMH_U.	10 MA	inner u-v coverage
	C/U_1.3	.SBMH_I.	10 MA	
20	C/U_1.3	.SBMH_Q.	10 MA	
	C/U_1.3	.SBMH_U.	10 MA	
	X/U_1.3	.SBML_I.	10 MA	
	X/U_1.3	.SBML_Q.	10 MA	
	X/U_1.3	.SBML_U.	10 MA /	
	U_1.5	.SBML_I.	10 MA \	
	U_1.5	.SBML_Q.	10 MA	native U band
	U_1.5	.SBML_U.	10 MA /	
	OL1_1.3	.SBMH_I.	10 MA \	
	OL1_1.3	.SBMH_Q.	10 MA	native 1.4 GHz
30	OL1_1.3	.SBMH_U.	10 MA /	
	OL1/X_3	.SBMH_I.	10 MA \	
	OL1/X_3	.SBMH_Q.	10 MA	
	OL1/X_3	.SBMH_U.	10 MA	
	NL2/X_3	.SBMH_I.	10 MA	
	NL2/X_3	.SBMH_Q.	10 MA	
	NL2/X_3	.SBMH_U.	10 MA	3 arcsec image set with X band
	C/X_3	.SBMH_I.	10 MA	inner u-v coverage
	C/X_3	.SBMH_Q.	10 MA	
	C/X_3	.SBMH_U.	10 MA	
40	X_3	.SBML_I.	10 MA	
	X_3	.SBML_Q.	10 MA	
	X_3	.SBML_U.	10 MA /	
	OL1/U_3	.SBMH_I.	10 MA \	
	OL1/U_3	.SBMH_Q.	10 MA	
	OL1/U_3	.SBMH_U.	10 MA	
	N2L2/U_3	.SBMH_I.	10 MA	
	N2L2/U_3	.SBMH_Q.	10 MA	

	N2L2/U_3	.SBMH_U.	10 MA		
	C/U_3	.SBMH_I.	10 MA		3 arcsec image set with U band
50	C/U_3	.SBMH_Q.	10 MA		inner u-v coverage
	C/U_3	.SBMH_U.	10 MA		
	X/U_3	.SBML_I.	10 MA		
	X/U_3	.SBML_Q.	10 MA		
	X/U_3	.SBML_U.	10 MA		
	U_3	.SBML_I.	1 MA		
	U_3	.SBML_Q.	1 MA		
	U_3	.SBML_U.	1 MA	/	
	C/X_.44	.SBMH_I.	10 MA	\	
	C/X_.44	.SBMH_Q.	10 MA		0.44 arcsec C band images with
60	C/X_.44	.SBMH_U.	10 MA	/	X band inner u-v coverage

Key:

- (1) First letter indicates frequency band.
 OL1 = 1.4 GHz
 N2L2 = 1.7 GHz
 C = 5 GHz
 X = 8.5 GHz
 U = 14.9 GHz
- (2) Letter following / indicates the frequency band u-v clipping.
 Thus, C/X means 5 GHz data clipped to X band inner (but not outer) u-v coverage (all u-v data inside .75 kilolambda radi removed in this case).
- (3) The number following _ indicates the resolution. Images with resolution lower than that intrinsic to the progenitor u-v data were made by imaging the u-v data with an outer u-v limit. A taper (dependent on frequency) was applied to make the beam shapes similar at the differently frequencies.
 _3 = a 3 arcsec resolution image
 _1.3 = a 1.3 arcsec resolution image
 _.44 = a 0.44 arcsec resolution image
- (4) The out sequence letters prior to _ mean the following:
 SBMH = a "HGEOMed" image was then sub-imaged
 SBML = a "LTISSed" image was then sub-imaged
- (5) The sequence number 10 means a "final" image.

From: mswain (Mark Swain)
To: abridle
Subject: Teleconference w/ Dan
Date: Mon, 2 Oct 1995 15:56:41 -0400

Alan,

Dan does not wish to commit to a conference time (for tomorrow afternoon) at this time. Tomorrow morning I should be able to get a time commitment out of Dan.

The most recent draft of my outline is Sep 7. It is the one Dan has been looking at so I won't update it. A copy of the outline follows.

Outline

(see end for abbreviations)

QUESTIONS:

- what feature(s) is/are ``the jet''?
 - jet =the volume through which E & p are transported to lobes
 - is the total I jet only a tracer of the ``true jet''?
 - if so, how is the total I jet related to the true jet?
 - how do we measure the width of the jet?
 - is the jet expanding?
- how do the widths, strengths, and existence of the multiple jet scales correlate?
 - is the cocoon wider where total I jet wider?
 - do jet, rails, cocoon all ``turn on'' together?
- what similarities or differences exist between sidedness relationships for jet features?
 - is J/CJ I flux ratio different from Jcocoon/CJcocoon ratio?
 - is the cocoon lobe material or jet material?
 - can a simple physical picture explain total I jet, rails, & cocoon?

- what constitutes a filament?
- what range of scales are associated with filaments
 - (I think there are at least 3 or 4 scales)
 - what physical parameters do the ranges of scale, when taken with other observed properties of filaments imply?
- can filaments be plausibly connected to other features in the source or are they formed by local effects?
 - do observed filament properties vary systematically w/ location
 - how do measured filament prop. compare w/ other parts of source

- is there a component to lobe emission other than filaments?
- are the lobe spectra consistent w/ spectral aging models?
- how organized are observed lobe properties?
 - potentially strong implications for particle transport

- generally, what are the B configurations and degree of organization for source features
 - jets, cocoons, filaments, lobes

There is a hierarchy of scales within the radio source ranging from the smallest features resolvable in the source to largest scales of lobe emission. On casual inspection jets, hot spots, filaments, and lobes each seem to define their own scales; in actuality, there is a range of features and scales associated with each of these categories. The way features on different scales are organized, correlate (or fail to) and the symmetries (or lack thereof) between categories of features on different sides of the central feature constrain the physical interpretation of the data.

JETS:

General Jet/Counterjet characteristics

- ~1% source flux at C band
(any wavelength dependence will be specified)
- miss alignment of initial axes
~6 degrees
- Jet/Counterjet arm length ratios
~0.75
- Jet/Counterjet (J/CJ) relative surface brightness
~2:1
- Jet mostly straight and traceable into hot spot
- CJ has at least 1 bend fairly early on
- CJ not traceable into either West lobe hot spot candidate
CJ bends ~180 deg. if the northern West lobe hot spot candidate steep gradient section is the ``working surface.''
- bright knots within jet and bright segment in CJ
knots at beginning and end of jet straight segment
(0.4 arcsec picture or contour plot - possibly a Sobel filter image). These oblique features are inclined to the jet axis by ~45 degrees.
- very low intrinsic polarization for J or CJ
give integrated polarized intensity limits for J&CJ
as well as integrated POLI slice limits for J&CJ
- polarization minima features border jet (rails)
look at picture
- cocoon of material around jet in both I and POLI

Jet and Counterjet Profile Shapes

- integrated independent transverse slices along jet
-emission excess (cocoon) very apparent
- jet total I profile shape either flat-topped or edge-brightened
-1,2, and 3 Gauss comp. fit results
-would be nice to have model to fit
- CJ total I profile
-(not been done yet because there is little to work w/)
-main question: is CJ profile qualitatively similar to J profile?
- POLI jet profiles seem to mostly have no jet emission
-show plot (avg. ambient POLI vs. POLI between rails)
-polarized jet emission is present at knots at beginning and end of straight jet segment.

The Rails

- rails ~0.4 arcsec wide (measured from 0.4 arcsec res. images)
- rails ~ 2.5 arcsec center-to-center separation
- frequency dependence of rail position?
-seems to be no systematic difference but should know better soon.

- rail depth estimated by extrapolating surrounding emission
- rails depth does not correlate w/ frequency
- show plot
- means rails not a Faraday depolarization effect
- rail depth correlates with ambient polarized position angle
- frequency dependence of this correlation?
- North and South rail different?
- suggests rails caused by cancelation of ambient polarized emission from emission in a thin sheath around the jet in which the B field has been sheared. Limb brightening then causes the rails.
- can the above model work quantitatively?

The Cocoon

- seen in both total I and POLI for Jet
- complex profile
- width varies by a factor of ~2 (total I)
- width variation in POLI?
- cocoon not detected for CJ (still true?)
- J-cocoon/CJ-cocoon limits
- can only do total I because of POLCO blanking
- can CJ-cocoon non-detect be ascribed to a J/CJ brightness ratio difference in the J & CJ cocoons?
- is J-cocoon spix jet-like or lobe-like?
- is there a systematic % polarization gradient?

Jet knots

- don't appear to be regions of changes in opening angle
- impose local order of jet B field
- width of this event?
- position of jet POLI max. in relation to feature?

Jet and Counterjet Opening Angle

- jet width by position of two Gaussians fit to total I slice regions
- lobe and cocoon emission corrected
- shows expansion and contraction
- opening angle ~2.2 degrees extrapolates back to core
- after ~50 arcsec jet opening angle ~-2.2 degrees
- same results with single component Gaussian fitting
- jet width by position of rails at slice regions
- rails have relatively constant width
- show plot of jet width by 2 Gaussian and rail position
- CJ width by single component Gaussian fit
- same initial opening angle as jet
- no evidence for change in opening angle along length of CJ
- couldn't use rail position to measure CJ width
- conclusion: depends on what constitutes the jet.
- jet defined by total I expands and contracts
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for spectral aging models

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From: mswain@truchas.cv.nrao.edu (Mark Swain)
To: abridle
Date: Fri, 13 Oct 95 15:39:47 EDT

Dan,

The following is my proposed schedule. It should contain two cases. The case presented is the "less jets" case in which less will be made of associations and relationships between the jet and other elongated features which might also visualize properties of the outflow. The other case is the "more jets" case in which jets and their relationships to associated features play a larger role in the thesis. The "more jets" case shifts everything back one week. By the middle of next week, I hope to know which case I will be using.

23 Oct. Alan gets preliminary jets chapter draft

30 Oct. Alan gets jet chapter draft

6 Nov. Dan and Alan get jet chapter draft
(this means Dan's copy leaves Fed X on 6 Nov.)

20 Nov. Alan gets preliminary filaments & lobes chapter draft

27 Nov. Alan gets filaments & lobes chapter draft

4 Dec. Dan and Alan get filaments & lobes chapter
(this means Dan's copy leaves Fed X on 4 Dec.)

18 Dec. Alan gets draft of introduction chapter

From: aips@rhesus.cv.nrao.edu (AIPS user)
To: abridle@rhesus.cv.nrao.edu
Date: Wed, 25 Oct 1995 17:53:56 -0400

\$This procedure is an attempt to automate production of 3C353 composit
\$deconvolved, "final" images. The steps it does are commented in.

- \$1) initial hot-spot and core clean removal, make dirty beams for VTESS
- \$2) vtess deconvolution
- \$3) rstor clean components from steps (1&2) to VTC image
- \$4) zero level measure, zero level correction
- \$5) primary beam correction
- \$6) puthead to align core to standard frame
- \$7) hgeom to grid image to standard frame
- \$8) subim result of (10) to standard size

\$
\$udi output file disk
\$ubdi baddisks
\$uvinna uv file name
\$uvincls uv file class
\$uvinseq uvfile seq
\$uvdi disk w/ uvdata
\$uscrdi scratch disk
\$una name for files from automated imaging process
\$useq the seq # used during automated sequence
\$ura rashift
\$udec decshift
\$utpr uvtaper
\$urng1 inner uvrangle
\$urng2 outer uvrangle
\$uflux1 flux level to clean to for lobes and core
\$uflux2 flux leve to further clean core too
\$vtniter vtess niter
\$utniter utess niter
\$vnoise vmap noise (used as noise in VT&UT)
\$keyvall RA ref pix shift
\$keyval2 DEC ref pix shitt
\$
\$=====\$
\$ Asign values to adverbs and inputs \$
\$=====\$

udi 7
ubdi 2,5
uvinna 'F53-C-ABCD'
uvincls 'XSC'
uvinseq 5
uvdi 7
uscrdi 3
una 'C/U_1.3'
useq 10
ura = .336
udec = 0
utpr 140,115
urng 1.475,204
uflux1 .026
uflux2 .008
vtniter 50
utniter 30
vnoise .000044
keyvall 1024, .15

```

keyval2 1025, .275
save 'mr_353_inputs'
$
$
$*****$
$                "Program" part                $
$*****$
$
$
$=====
$ pre-clean I, dirty QU images and IQU beams #1 $
$=====
get 'mr_353_inputs'
    task 'mx'
        INNAME      uvinna
        INCLASS     uvincls
        INSEQ       uvinseq
        INDISK      uvdi
        IN2NAME     una
        IN2CLASS    'uvwork'
        IN2SEQ      0
        IN2DISK     uscrdi
        BCHAN       1
        ECHAN       0
        CHANNEL     0
        NPOINTS     1
        CHINC       1
        STOKES      'I  '
        BIF         1
        EIF         2
        OUTNAME     una
        OUTDISK     udi
        OUTSEQ      useq
        CELLSIZE    .32      .32
        IMSIZE      2048      2048
        NFIELD      1
        FLDSIZE     0
        RASHIFT     ura
        DECSHIFT    udec
        NBOXES      3
        box(1,1)    1017.00
        box(2,1)    1019.00
        box(3,1)    1033.00
        box(4,1)    1032.00
        box(1,2)    640.00
        box(2,2)    935.00
        box(3,2)    815.00
        box(4,2)    1130.00
        box(1,3)    1378.00
        box(2,3)    930.00
        box(3,3)    1443.00
        box(4,3)    1042.00
        UVTAPER     utpr
        UVRANGE     urng
        UVWTFN      '  '
        UVBOX       0
        ZEROSP      0
        XTYPE       5
        YTYPE       5

```

```

        XPARAM          0
        YPARAM          0
        GAIN             .001
        FLUX             uflux1
        MINPATCH       1024
        NITER           100000
        BCOMP           0
        BMAJ            -1
        BMIN            1.3
        BPA             0
        PHAT            0
        FACTOR          -.5
        DOTV            -1
        CMETHOD       ' '
        GUARD           -1,-1
        MAXPIXEL        0
        BADDISK         ubdi
go mx                               $clean hot-spots and core
    wait mx
    indi udi
    inna una
    inclass 'icl'n'
    inseq useq
    keyword 'niter'
geth                               $find number of cc for restart
    tget mx
    niter 100000
    bcomp keyvalue(1)
    nboxes 1
    flux = uflux2
go mx                               $clean core some more
    wait mx
    get 'mr_353_inputs'
    inna una
    inclass 'icl'n'
    inseq useq
    indi udi
    outna una
    outclass 'vticl'n'
    outseq useq
    outdi udi
go rename                          $rename icl'n to vticl'n
    inna una
    inclass 'ibeam'
    inseq useq
    indi udi
    intype 'ma'
zap                                $zap old ibeam
    recat
    tget mx
    niter 0
    bcomp 0
go mx                               $make dirty ibeam for VT
    wait mx
    inna una
    inclass 'ibeam'
    inseq useq
    indi udi
    outna una

```

```

        outclass 'vtibem'
        outseq useq
        outdi udi
go rename                               $rename ibeam to vtibem
    tget mx
        stokes 'q'
$go mx                                   $make dirty Q map and beam
    wait mx
        stokes 'u'
$go mx                                   $make dirty U map and beam
    wait mx
$=====
$                VT and UT deconvolution                $
$=====
get 'mr_353_inputs'
    task 'vtess'
        INNAME      una
        INCLASS     'VTICLN'
        INSEQ       useq
        INDISK      udi
        IN2NAME     una
        IN2CLASS    'VTIBEM'
        IN2SEQ      useq
        IN2DISK     udi
        IN3NAME     '      '
        IN3CLASS    '      '
        IN3SEQ      0
        IN3DISK     uscrdi
        OUTNAME     una
        OUTCLASS    'VT  '
        OUTSEQ      useq
        OUTDISK     udi
        OUT2NAME    una
        OUT2CLAS   'VTC  '
        OUT2SEQ     useq
        OUT2DISK    udi
        NMAPS       1
        NITER       vtniter
        NOISE       vnoise
        FLUX        0
        BLC         0
        TRC         0
        DOTV        -1
        PRTLEV      1
        PBSIZE      0
        BMAJ        1.3
        BMIN        1.3
        BPA         0
        BADDISK     ubdi
go vtess                                 $stokes I MEM
    wait
    vtess
        recat
        tget vtess
        task 'utes'
            inclass 'qmap'
            in2class 'qbeam'
            outclass 'qt'
            out2clas 'qtc'

```

```

$go utess                                $stokes Q MEM
    wait utess
$    recat
    tget utess
        inclass 'umap'
        in2class 'ubeam'
        outclass 'ut'
        out2clas 'utc'

$go utess                                $stokes U MEM
    wait utess
$    recat
$=====
$    restor pre-cleaned cc to VTC image    $
$=====
get 'mr_353_inputs'
    inna una
    inclass 'vticln'
    inseq useq
    indi udi
    keyword 'niter'

geth                                     $determine number of cc to rstor
    task 'rstor'
        niter = keyvalue(1)
        INNAME    una
        INCLASS   'VTC  '
        INSEQ     useq
        INDISK    udi
        BLC       0
        IN2NAME   una
        IN2CLASS  'VTICLN'
        IN2SEQ    useq
        IN2DISK   udi
        INVERS    0
        OUTNAME   una
        OUTCLASS  'RSTOR '
        OUTSEQ    useq
        OUTDISK   udi
        $NITER    ccnum
        BMAJ      1.3
        BMIN      1.3
        BPA       0
        BADDISK   ubdi
    type 'restoring',niter,' clean comp.'
go rstor                                 $rstor clean comp.
    wait rstor
$=====
$    determine and apply zero level correction    $
$=====
$get 'mr_353_inputs'
    inname una
    inclass 'rstor'
    inseq useq
    indi udi

zlc1p3                                   $determine zerl level correction
    type avg
    aparm(3) = -avg
    type aparm(3)
    task 'comb'
        INNAME    una

```



```

        INCLASS      'rstor'
        INSEQ        useq
        INDISK       udi
        IN2NAME      una
        IN2CLASS     'rstor'
        IN2SEQ       useq
        IN2DISK      udi
        DOALIGN      1
        OUTNAME      una
        OUTCLASS     'ZLCRST'
        OUTSEQ       useq
        OUTDISK      udi
        BLC          0
        TRC          0
        OPCODE      'sum'
        aparm 0
        APARM(1)    1
        aparm(2)    1E-30
        BPARAM      0
        opcode      'sum'
        aparm(3) = -avg
    type 'Adding', aparm(3), 'to im to correct zero level offset.'
go comb                                $apply zero level correction
    wait comb
$=====
$          apply primary beam correction          $
$=====
get 'mr_353_inputs'
    task 'pbcor'
        USERID      0
        INNAME       una
        INCLASS     'ZLCRST'
        INSEQ       useq
        INDISK      udi
        BLC         0
        TRC         0
        OUTNAME     una
        OUTCLASS   'PBCZLC'
        OUTSEQ      useq
        OUTDISK     udi
        DPARAM      0
        GPOS        0
go pbcor                                $pbcor I image
    wait pbcor
    tget pbcor
        inclclass 'qtc'
        outclass 'pbcqtc'
$go pbcor                                $pbcor Q image
    wait pbcor
        inclclass 'utc'
        outclass 'pbcutc'
$go pbcor                                $pbcor U image
    wait pbcor
$=====
$          puthead to set IQU image RA&DEC          $
$=====
get 'mr_353_inputs'
    task 'subim'
        USERID      0

```

```

        INNAME      una
        INCLASS     'PBCZLC'
        INSEQ       useq
        INDISK      udi
        OUTNAME     una
        OUTCLASS    'pthpbi'
        OUTSEQ      useq
        OUTDISK     udi
        BLC         0
        TRC         0
        XINC        1
        YINC        1
        OPCODE      '  '
go subim                $copy I image
    wait subim
    tget subim
        inclass 'pbcqvt'
        outclass 'pthpbq'
$go subim                $copy Q image
    wait subim
    tget subim
        inclass 'pbcuvt'
        outclass 'pthpbu'
$go subim                $copy U image
    wait subim
    task 'puth'
        inna una
        inclass 'pthpbi'
        inseq useq
        indi udi
        keyword 'CRPIX1'
        keyvalue keyvall
puthead                $puthead I RA
        keyword 'CRPIX2'
        keyvalue keyval2
puthead                $puthead I DEC
        pixxy 1025,1025
maxfit                $check
    type 'should be: '
        inclass 'pthpbq'
        inseq useq
        indi udi
        keyword 'CRPIX1'
        keyvalue keyvall
$puthead                $puthead Q RA
        keyword 'CRPIX2'
        keyvalue keyval2
$puthead                $puthead Q DEC
        inclass 'pthpbu'
        inseq useq
        indi udi
        keyword 'CRPIX1'
        keyvalue keyvall
$puthead                $puthead U RA
        keyword 'CRPIX2'
        keyvalue keyval2
$puthead                $puthead U DEC
$=====
$          hgeom IQU images onto same grid          $

```

```

$=====
get 'mr_353_inputs'
  task 'hgeom'
    INNAME      una
    INCLASS     'pthpbi'
    INSEQ       useq
    INDISK      udi
    IN2NAME     '353W-X/L2  '
    IN2CLASS    'ZLCRST'
    IN2SEQ      2
    IN2DISK     3
    OUTNAME     una
    OUTCLASS    'hgmphi'
    OUTSEQ      useq
    OUTDISK     udi
    BLC         0
    TRC         0
    IMSIZE      0          0
    APARM       0          1
go hgeom          $grid I image
  wait hgeom
  tget hgeom
    inclass 'pthpbq'
    outclass 'hgmphq'
$go hgeom          $grid Q image
  wait hgeom
  tget hgeom
    inclass 'pthpbu'
    outclass 'hgmphu'
$go hgeom          $grid U image
  wait hgeom
$=====
$                subim final IQU images                $
$=====
get 'mr_353_inputs'
  task 'subim'
    USERID     0
    INNAME      una
    INCLASS     'hgmphi'
    INSEQ       useq
    INDISK      udi
    OUTNAME     una
    OUTCLASS    'SBMH_I'
    OUTSEQ      useq
    OUTDISK     udi
    BLC         536        794
    TRC         1491       1361
    XINC        1
    YINC        1
    OPCODE      '  '
go subim          $subim I image
  wait subim
  tget subim
    inclass 'hgmphq'
    outclass 'sbmh_q'
$go subim          $subim Q image
  wait subim
  tget subim
    inclass 'hgmphu'

```

```
outclass 'sbmh_u'
$go subim          $subim U image
  wait subim
$#####
```

From: mswain@truchas.cv.nrao.edu (Mark Swain)
To: abridle
Date: Wed, 25 Oct 95 17:57:37 EDT

udi 4
ubdi 0
uvinna '353-L1-ABC'
uvincls 'XSC'
uvinseq 5
uvdi 4
uscrdi 4
una 'L1/X_1.3'
useq 1
ura = .0336
udec = 0
utpr 0
urng .75,0
uflux1 .055
uflux2 .008
vtniter 20
utniter 20
vnoise 7.32E-5
keyval1 1024, .4182
keyval2 1024, .9062

From: mswain (Mark Swain)
To: abridle
Subject: automated imaging run file
Date: Wed, 25 Oct 1995 18:06:47 -0400

I have sent you two files. The first is an aips run file for performing the automated final imaging sequence. The second is a file which lists the inputs to the run file. The inputs are for 1385 MHz with pseudo-X band sampling (inner u-v data removed to a the radius of the inner-most 8.4 GHz u-v data). Each frequency, resolution, and u-v combination has it's own input file. At some point you should give you a copy of all of them. The run files differ for different resolutions. The one I sent you makes 1.3 arcsec FWHM images.

Mark

From: mswain@truchas.cv.nrao.edu (Mark Swain)
 To: abridle
 Date: Fri, 27 Oct 95 19:12:13 EDT

dist	X rail seperation			L rail seperation		
	width			width		
kpc	kpc	er	*	kpc	er	* interval of jet in kpc
12.6	0	0	0.61	1.35	0.17	
13.2	1.2	0.13	0.61	1.05	0.13	
15.6	0	0	0.61	1.35	0.13	
18	0	0	0.61	1.28	0.15	
20.5	1.58	0.16	0.61	0	0	
21.7	1.35	0.13	0.61	1.28	0.16	
22.3	0	0	0.61	1.2	0.13	
22.9	1.13	0.16	0.61	1.13	0.16	
23.5	0	0	0.61	1.5	0.13	
24.1	0	0	0.61	1.73	0.15	
25.9	1.8	0.13	0.61	0	0	
26.5	0	0	0.61	1.35	0.13	
28.3	0	0	0.61	1.35	0.13	
29.5	1.73	0.16	0.61	0	0	
32.5	2.03	0.16	0.61	0	0	
34.3	0	0	0.61	1.43	0.16	
34.9	1.43	0.16	0.61	0	0	
35.5	1.96	0.13	0.61	0	0	
36.1	1.65	0.13	0.61	1.65	0.13	
36.7	1.58	0.15	0.61	1.5	0.13	

From: mswain@truchas.cv.nrao.edu (Mark Swain)
To: abridle
Date: Sat, 28 Oct 95 21:17:56 EDT

11.4	0	0	0.61	1.35	0.17	
12	1.2	0.13	0.61	1.05	0.13	
14.4	0	0	0.61	1.35	0.13	
16.8	0	0	0.61	1.28	0.15	
19.3	1.58	0.16	0.61	0	0	
20.5	1.35	0.13	0.61	1.28	0.16	
21.1	0	0	0.61	1.2	0.13	
21.7	1.13	0.16	0.61	1.13	0.16	
22.3	0	0	0.61	1.5	0.13	
22.9	0	0	0.61	1.73	0.15	
24.7	1.8	0.13	0.61	0	0	
25.3	0	0	0.61	1.35	0.13	
27.1	0	0	0.61	1.35	0.13	
28.3	1.73	0.16	0.61	0	0	
31.3	2.03	0.16	0.61	0	0	
33.1	0	0	0.61	1.43	0.16	
33.7	1.43	0.16	0.61	0	0	
34.3	1.96	0.13	0.61	0	0	
34.9	1.65	0.13	0.61	1.65	0.13	
35.5	1.58	0.15	0.61	1.5	0.13	

From: mswain (Mark Swain)
To: abridle
Subject: Jet-Sheath relationship data
Date: Tue, 7 Nov 1995 10:33:59 -0500

12 regions along jet (units of flux are mJy;dist units kpc)

dist	CocFlx	CFer	JF	JFer
9.024	7.782	1.649	2.136	0.463
12.03	13.011	0.599	14.406	0.696
15.04	9.327	1.180	2.752	0.224
18.05	9.834	0.831	0.649	0.513
21.06	9.353	0.412	2.822	0.121
24.06	0.237	2.570	3.069	0.172
27.07	10.414	3.460	6.240	0.501
30.08	15.514	6.303	5.556	1.267
33.09	22.164	4.293	10.341	0.640
36.1	19.792	1.733	22.573	0.063

From: mswain (Mark Swain)
To: abridle
Subject: arrows in ps files
Date: Wed, 8 Nov 1995 10:12:06 -0500

Alan,

I seem to have misplaced your instructions
for making arrows in post script files. Would
you mind sending me another example of how to do
that?

Mark

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: arrows in ps files
Date: Wed, 8 Nov 1995 10:37:00 -0500

Mark Swain writes:

> Alan,
>
> I seem to have misplaced your instructuions
> for making arrors in post scrpit files. Would
> you mind sending me another example of how to do
> that?
>
> Mark

Macros are near start, usage near end, of this file:

=====

From: abridle (Alan Bridle)
To: mswain
Subject: 3c353 wfpc2 image
Date: Mon, 13 Nov 1995 10:00:00 -0500

is in /AIPS/FITS/3C353HST.FIT

A.

From: mswain (Mark Swain)
To: abridle
Subject: jet
Date: Mon, 13 Nov 1995 10:31:01 -0500

I must have gotten confused.
The tube distribution produces the
expected results when specifying a non-zero
inner radius with a helical field.

Mark

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: jet
Date: Mon, 13 Nov 1995 10:40:27 -0500

Mark Swain writes:

- > I must have gotten confused.
- > The tube distribution produces the
- > expected results when specifying an non-zero
- > inner radius with a helical field.
- >
- > Mark

I have also tested this. I cannot get exactly the same results as in Robert's paper, but they are very nearly the same. The small difference may need some probing, but it is second-order.

A.

From: mswain (Mark Swain)
To: abridle
Subject: X band, 0.44 fnl images
Date: Tue, 14 Nov 1995 14:37:08 -0500

Alan,

I have made the I,Q,U final
0.44 FWHM, 8.4 GHz images.
You can give me you "final image"
tape and I can put them on it
or I can put the images out
in the FITS area.

Mark

From: abridle (Alan Bridle)
To: mswain (Mark Swain)
Subject: Re: 353 paper
Date: Thu, 16 Nov 1995 13:44:23 -0500

Mark Swain writes:

> Have re-read paper and have no further comments.
>

I'll send it to Phil.

What do you want to do about the glossy for Fig.1 now?

> "final" 0.44 arcsec, 8.4 GHz Stokes Q and U images
> in FITS area undernames:
>
> X_.44.SBML_Q.10.353
> X_.44.SBML_U.10.353
>

I have copied these to my disk successfully so you can delete them any time convenient.

It occurs to me that there is a problem with computing the P image from these as the primary beam correction is now done and this distorts the Ricean bias correction. Maybe we have to neglect this, but it is a nuisance.

It would be better to compute the P images from the separated Q and U images for each pointing and then run LTESS on the composite P image?

A.

From: "Mark R. Swain" <swain@astrosun.tn.cornell.edu>
To: abridle@nrao.edu
Subject: email address
Date: Thu, 15 Feb 1996 17:05:16 -0500 (EST)

swain@astrosun.tn.cornell.edu

From: abridle (Alan Bridle)
To: "Mark R. Swain" <swain@astrosun.tn.cornell.edu>
Subject: Re: email address
Date: Thu, 15 Feb 1996 20:38:13 -0500

Gotcha. Hope the move went o.k.

A.

From: "Mark R. Swain" <swain@astrosun.tn.cornell.edu>
To: abridle@nrao.edu
Subject: defense date
Date: Fri, 23 Feb 1996 10:28:34 -0500 (EST)

Alan,

My defense has been scheduled for 2:00 pm March 28.
It will be held in a as yet to be determined room in the
Physics and Astronomy Building. My current plan is to drive
up the morning of the 28th.

Mark

From: abridle (Alan Bridle)
To: "Mark R. Swain" <swain@astrosun.tn.cornell.edu>
Subject: Re: defense date
Date: Fri, 23 Feb 1996 11:41:24 -0500

Mark R. Swain writes:

> Alan,
>
> My defense has been scheduled for 2:00 pm March 28.
> It will be held in a as yet to be determined room in the
> Physics and Astronomy Building. My current plan is to drive
> up the morning of the 28th.
>
> Mark
>

OK. it's in my calendar.

N.B. I was working on the bibliography for the Alabama proceedings and took a quick look at yours while doing some checking. It seems you had an accident of some kind: lots of volume numbers missing from it and also a few years missing. Also some items out of order -- actually not clear whether the order was meant to be entirely alphabetical or partly chronological. Will need some fixing, whichever.

It's now warm and foggy down here. Both the snow had gone.

A.

From: "Mark R. Swain" <swain@astrosun.tn.cornell.edu>
To: abridle@nrao.edu
Subject: 353 B fld
Date: Mon, 11 Mar 1996 18:02:27 -0500 (EST)

Alan,

I would like to compare my equipartition calculation spread-sheet with yours. Here is a sample calculation based on the following values.

average flux density 0.0003 Jy/beam
z 0.0304
Ho 100 km/s/Mpc
spectral index -1.01 $S=S_0\nu^{\alpha}$
frequency 4.885 GHz
Beam FWHM 0.4 arcsec
region radius 3.0 arcsec
filling fact. 1
k 1
C13 28000
C12 71000000

distance to 3C353 91.2 Mpc
Luminosity (FWHM area) 1.0E31 watts
Lum. region 1.6E33 watts
1 arcsec projected 442.32 parsecs
total minimum Energy 2.4E55 ergs
B field minimum energy 0.303 micro Gauss

These results assume integrating S over frequency from 1E7 to 1E11 Hz. "Region" is a cylindrical area (viewed end on of course) for which the minimum energy and B field are calculated; the cylinder has a height of 2*(region radius). k is ratio of heavy particle energy to electron energy. C13 and C12 correspond to the Pacholczyk definitions.

I suspect that my spreadsheet is a factor of 10 low in calculating B minimum energy values.

Mark

From: "Mark R. Swain" <swain@astrosun.tn.cornell.edu>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject:
Date: Tue, 12 Mar 1996 10:42:21 -0500 (EST)

Alan,

Do you have a 35mm slide of 3C 31 (total intensity) I could have? I would like to use it in a talk I will be giving here.

Mark

From: abridle (Alan Bridle)
To: "Mark R. Swain" <swain@astrosun.tn.cornell.edu>
Subject: Re:
Date: Wed, 13 Mar 1996 13:01:04 -0500

Mark R. Swain writes:

> Alan,
>
> Do you have a 35mm slide of 3C 31 (total intensity) I
> could have? I would like to use it in a talk I will
> be giving here.
>
> Mark
>

Nothing recent is on 35mm. I have some color .PS files
though. What scale/resolution do you want?

A.

From: abridle (Alan Bridle)
To: "Mark R. Swain" <swain@astrosun.tn.cornell.edu>
Subject: Re: 353 B fld
Date: Wed, 13 Mar 1996 13:36:49 -0500

Mark R. Swain writes:

> Alan,
>
> I would like to compare my equipartition calculation
> spread-sheet with yours. Here is a sample calculation
> based on the following values.
>
> average flux density 0.0003 Jy/beam
> z 0.0304
> Ho 100 km/s/Mpc
> spectral index -1.01 $S=S_0\nu^{\alpha}$
> frequency 4.885 GHz
> Beam FWHM 0.4 arcsec
> region radius 3.0 arcsec
> filling fact. 1
> k 1
> C13 28000
> C12 71000000
>
> distance to 3C353 91.2 Mpc
> Luminosity (FWHM area) 1.0E31 watts
> Lum. region 1.6E33 watts
> 1 arcsec projected 442.32 parsecs
> total minimum Energy 2.4E55 ergs
> B field minimum energy 0.303 micro Gauss
>
>
> These results assume integrating S over frequency from
> 1E7 to 1E11 Hz. "Region" is a cylindrical area (viewed
> end on of course) for which the minimum energy and B field
> are calculated; the cylinder has a height of 2*(region radius).
> k is ratio of heavy particle energy to electron energy.
> C13 and C12 correspond to the Pacholczyk definitions.
>
> I suspect that my spreadsheet is a factor of 10 low
> in calculating B minimum energy values.
>
> Mark
>

I have done what I think is the same calculation:

For a filled cylinder whose surface area is that of a 0.4" Gaussian beam and whose depth is 3 arcsec, at z=0.0304, and whose flux density per beam is 0.0003 Jy at 4885 MHz, s.i. 1.01:

1" = 0.42 kpc
D = 91.8 Mpc
L = 1.4 E31 W
Emin = 1.6 E46 J for k=1
Beq = 3.8 E-5 gauss

A.

From: "Mark R. Swain" <swain@astrosun.tn.cornell.edu>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: 3C 31
Date: Wed, 13 Mar 1996 15:42:13 -0500 (EST)

>
> Nothing recent is on 35mm. I have some color .PS files
> though. What scale/resolution do you want?
>

I want to show the region you and Robert are fitting
along with about an equal amount (of angular distance)
jet and counterjet beyond that region. I would like the
enough resolution in the image to demonstrate that there
are features - such as the arcs - which are not taken into
account by Roberts model but that the model, none-the-less,
is a good approximation to the jet and counterjet before the
first bend in the jet. So, what every resolution will accomplish
the above goals will be fine with me. If what you will be
providing is a large .ps image, then it is probably better
for me to ftp it.

Mark

From: abridle (Alan Bridle)
To: swain@astrosun.tn.cornell.edu
Subject: 3C31 images
Date: Wed, 13 Mar 1996 17:30:02 -0500

There are now color .ps files for two 3C31 images in the NRAO-staff/abridle directory on the C'ville ftp server:

3c31xhi.ps is a color rendition of the 8.4 GHz image at 0.3" resolution showing the features you mentioned. It also shows that the main jet brightens away from the core at first (as expected if it emerges from Doppler "hiding" at first, then goes through the expected maximum that corresponds to the spine field being edge-on in the jet rest-frame (before aberration). In contrast, the counterjet intensity increase is monotonic, as expected. Further, you can see the "flaring" of the outer contours where the main jet decelerates hardest, as expected from dumping of bulk k.e. into heat through the mass-loading. Lot of goodies in one picture!

3c31xsid.ps is a color rendition of the "sidedness" ratio image obtained by rotating the counterjet on top of the jet and dividing to obtain an image of the cj/j intensity ratio. This clearly demos our main point: that the ratios down the flaring sides of the jet are consistent with much slower flow there than in the spine. The longitudinal decrease of the ratio implying deceleration of the spine as you go along the jet is also very clear. This display stops where the jet starts to bend, and illustrates that the spine has symmetrized before the bending starts, so the jet is probably well into the subrelativistic regime when it starts to bend.

Make sure you say the words "Robert Laing" every other sentence while showing this stuff to anyone

Let me know when you have ftp'd them as I would like to get them off Jeff's disk a.s.a.p.

Thanks, A.

From: "Mark R. Swain" <swain@astrosun.tn.cornell.edu>
To: abridle@nrao.edu
Subject: Thesis corrections
Date: Mon, 18 Mar 1996 22:06:24 -0500 (EST)

Alan,

I am thinking of coming back to C'ville to make what ever thesis corrections need to be made, assuming they are not completely trivial. The computing situation here is quite bad. I have asked Gareth if I can use truchas during the first week of April and he thinks it would be ok. I still need to get Gordon's approval.

I'll list the worst of the computer problems.

- 1) No DAT drives (practically speaking) in the building
- 2) No disk space anywhere
- 3) a version of ispell so old its almost unrecognizable
- 4) Feudal approach to networking and computing resources.

It's been difficult to work on the thesis. I bought myself a machine but it hasn't shown up yet. I bought myself a DAT drive as well. Gordon said he had a DAT drive in the lab - turns out he didn't know a the difference between a DAT drive and a QUIC tape.

Mark

From: abridle (Alan Bridle)
To: "Mark R. Swain" <swain@astrosun.tn.cornell.edu>
Subject: Re: Thesis corrections
Date: Mon, 18 Mar 1996 23:32:11 -0500

Mark R. Swain writes:

> Alan,
>
> I am thinking of coming back to C'ville to make
> what ever thesis corrections need to be made,
> assuming they are not completely trivial. The
> computing situation here is quite bad. I have
> asked Gareth if I can use truchas during the first
> week of April and he thinks it would be ok. I
> still need to get Gordon's approval.
>

Sounds a bit grim, and presumably does not bode well for
doing much data reduction on VLA/VLBA projects there.
I think Jim Condon has been using truchas for survey
things but Gareth will know all about that, of course.
I guess making sure you got as much as possible done
while here was indeed the right strategy, then.

A.

From: "Mark R. Swain" <swain@astrosun.tn.cornell.edu>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: Re: Address
Date: Tue, 19 Mar 1996 10:27:58 -0500 (EST)

>
> I need to update your mailing address for the Alabama
> participants' list. Can you send me the full mailing
> address, phone/fax numbers for your current office?
>

224 Space Sciences Building
Cornell Unibersity
Ithaca, NY 14853

phone: 607-255-3140
fax: 607-255-5875

From: "Mark R. Swain" <swain@astrosun.tn.cornell.edu>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: Re: Thesis corrections
Date: Tue, 19 Mar 1996 11:12:19 -0500 (EST)

>
> Sounds a bit grim, and presumably does not bode well for
> doing much data reduction on VLA/VLBA projects there.

I should be in better shape when I get my new machine.
It will be a 133 MHz Pentium running Linux. I'll install
AIPS and all the other goodies I want. If I need more disk,
I'll just buy it. For computationally intensive jobs, I
can always use the DEC alpha or rhesus and ringtail. I can
always ftp postscript plots and images even if I can't
set the AIPS TV to a remote host.

Mark

From: abridle (Alan Bridle)
To: swain@astrosun.tn.cornell.edu
Subject: Alabama update
Date: Tue, 19 Mar 1996 23:03:09 -0500

We are about to put the whole bibliography for the meeting together and I'll send you this as soon as I have it, as it may help you when you are touching up yours.

I have also done what I hope is the last pass across all the papers I have been editing, including my review, and the .ps files for these are updated in my area off the conference home page. Feel free to browse them, especially my review as I have touched on quite a few of the points we discussed about 353 and continuity with other things. Any comments you have on that would be welcome.

A.

From: abridle (Alan Bridle)
To: swain@astrosun.tn.cornell.edu
Subject: darker 353 .ps
Date: Wed, 20 Mar 1996 10:24:11 -0500

Mark,

While I was fiddling with the Alabama .ps files I recalled that you said you would like the image that we are showing in the conference proceedings to be a little darker round the edges. Please compare swain.ps and swainold.ps in ftp/NRAO-staff/abridle/alabama/private and tell me which you prefer.

There's a lot of variation in how dark things come up on printers, but the new version is just a tad darker on the printer we will be using for the final run.

It's also smaller on disk, making the file easier to load.

I will keep the .gif image as before in the HTML version as it looks pretty good on most TV screens I have displayed it on.

A.

From: "Mark R. Swain" <swain@astrosun.tn.cornell.edu>
To: abridle@nrao.edu
Subject: C'ville
Date: Mon, 25 Mar 1996 09:49:15 -0500 (EST)

Alan,

Who should I talk to about getting a key to my old office and the building? Do you think you might be able to bring those keys up with you? I will be arriving in in C'ville Saturday night (mar 30) and will probably want to start work on Sunday morning.

Mark

From: abridle (Alan Bridle)
To: "Mark R. Swain" <swain@astrosun.tn.cornell.edu>
Subject: Re: C'ville
Date: Mon, 25 Mar 1996 13:38:41 -0500

Mark R. Swain writes:

> Alan,
>
> Who should I talk to about getting a key to my old office and
> the building? Do you think you might be able to bring
> those keys up with you? I will be arriving in in C'ville
> Saturday night (mar 30) and will probably want to start
> work on Sunday morning.
>

To play it safe, contact Amy Shepherd.

I will get back to you on Tuesday evening re details. I am having some medical tests done on Tuesday afternoon. I am not expecting anything untoward but my doc wants to see the results before he okays me for traveling out of town. If there are any surprises we may need to do some last-minute rearranging.

A.

From: "Mark R. Swain" <swain@astrosun.tn.cornell.edu>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: JET
Date: Mon, 25 Mar 1996 18:23:40 -0500 (EST)

Alan,

As I understand it, the JET program divides the model jet into 1301 cells along 131 lines of sight. Does this mean that size of the grid varies along different lines of sight (ie, the grid is smaller in one axis at the edge of the jet than the grid is at the center of the jet)?

Best wishes for the medical tests. Don't risk anything to come up for the defense. I would like to have you there but not at the cost of possible medical problems. We could have you sit in by telcon if we needed to.

Mark

From: abridle (Alan Bridle)
To: "Mark R. Swain" <swain@astrosun.tn.cornell.edu>
Subject: Re: JET
Date: Tue, 26 Mar 1996 02:01:26 -0500

Mark R. Swain writes:

> Alan,
>
> As I understand it, the JET program divides the model jet into 1301 cells
> along 131 lines of sight. Does this mean that size of the grid varies
> along different lines of sight (ie, the grid is smaller in one axis at
> the edge of the jet than the grid is at the center of the jet)?
>

No, the cells are of constant size.. there are simply fewer of them that intersect emission as you go to the edge of the jet. I.e. the grid is a cube. The cylindrical jet sits within it.

A.

From: abridle (Alan Bridle)
To: dmw@isis.pas.rochester.edu
Subject: Defense arrangement
Date: Tue, 26 Mar 1996 08:59:06 -0500

Mark R. Swain writes:

> Alan,
>
> Best wishes for the medical tests. Don't risk anything to come up for
> the defense. I would like to have you there but not at the cost of
> possible medical problems. We could have you sit in by telcon if we
> needed to.
>
> Mark
>

Dan, is a telecon a viable alternative? I hope to have my own situation clear by this afternoon but on top of this my father-in-law died this morning so it is an unfortunate time for me to be away from home.

A.

From: "Mark R. Swain" <swain@astrosun.tn.cornell.edu>
To: abridle@nrao.edu
Subject: ApJ ltr
Date: Mon, 6 May 1996 09:50:36 -0400 (EDT)

Alan,

I have not had a chance to make a draft of the ApJ letter yet -- but I want to. I'll try to have a draft together by the end of May. Gordon has been keeping my busy; I've been up to Rochester twice to test mesh for our filters and today I'm off to NASA Ames for a week to learn how assemble and cool down the bolometer dewar.

Mark

From: "Mark R. Swain" <swain@astrosun.tn.cornell.edu>
To: abridle@nrao.edu
Subject: Re: 3C 353 (fwd)
Date: Mon, 6 May 1996 10:08:31 -0400 (EDT)

I thought you would find this interesting. Apparently, 3C 353 is a little more like a typical FR II (for it's optical luminosity) and less like a transition FRI/II source than the radio power alone might suggest.

----- Forwarded message -----
Date: Fri, 26 Apr 1996 16:56:57 -0600 (MDT)
From: Frazer Owen <fowen@aoc.nrao.edu>
To: swain@astrosun.tn.cornell.edu
Subject: Re: 3C 353

Mark,

If I am interpreting my notes right for the diagram, I have the Log (luminosity) at 20cm ($H_0=75$) as 26.00. For $M_{24.5(R)}$, I have -22.8. This puts 3C353 at a fairly typical optical luminosity for a radio galaxy, about 1 magnitude brighter than L_* . In the diagram it falls about 1 in the log above the FR I/II break, in fact right in middle of the the II's have plotted at -22.8.

---Frazer

From: abridle (Alan Bridle)
To: "Mark R. Swain" <swain@astrosun.tn.cornell.edu>
Subject: Re: ApJ ltr
Date: Mon, 6 May 1996 13:39:26 -0400

Mark R. Swain writes:

> Alan,
>
> I have not had a chance to make a draft of the ApJ letter yet -- but I
> want to. I'll try to have a draft together by the end of May. Gordon
> has been keeping my busy; I've been up to Rochester twice to test mesh
> for our filters and today I'm off to NASA Ames for a week to learn how
> assemble and cool down the bolometer dewar.
>

Have a good. I'm working with Robert on the 3C31 modeling at the moment and we are having some success while also discovering a few remaining limitations of the 2-d shear layer model. I'll be on vacation for Friday and next Monday. End of May would be an excellent time for me to get into working on your draft.

The Alabama proceedings were submitted last week, they will be Vol.100 of the series. Final versions of all papers are available from the conference home page.

Cheers, A.