Ah, SPAN's wonders. Will work this way for a while, at least until
I make the conversion to our new UNIX server soon (CVAX will be taken
out of service for the usual reasons that maintenance costs exceed
the cost of buying more powerful machines!).

Mary and I are both doing well. She started a new job today, in charge
of outpatient O.T. at the Blue Ridge Hospital (at the foot of Monticello
Mountain). She is looking forward to working with patients again
instead of grant applications.

I hope to be able to send you a draft of the observational paper on the
quasar counterjet search before too long. I have it about 80% done
but am still distracted by such things as AIPS Site Survey and the
NRAO computer plan. It's going to be a large package, but quite a
useful one.

Cheers, A.

From root Tue Nov 3 14:00:43 1992
X-VM-VHeader: ("From:" "Sender:" "Resent-From" "To:" "Apparently-To:" "Cc:" "Subject:" "Date:" "Resent-Date:") nil
X-VM-Bookmark: 25
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
    ["2062" "Tue" "3" "November" "92" "18:40" "GMT" "\"Robert Laing, RGO, Cambridge\""
"\"CAVAD::RL\"@STARLINK.ASTRONOMY.CAMBRIDGE.AC.UK" "<9211031900.AA15415@polaris.cv.nrao.edu>"
"35" "Data reduction" "^From:" nil nil "11"])
Received: from sun2.nsfnet-relay.ac.uk by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
      id AA15415; Tue, 3 Nov 92 14:00:40 -0500
Message-Id: <9211031900.AA15415@polaris.cv.nrao.edu>
Via: uk.ac.cambridge.astronomy.starlink; Tue, 3 Nov 1992 18:40:18 +0000
From: "Robert Laing, RGO, Cambridge" <"CAVAD::RL"@STARLINK.ASTRONOMY.CAMBRIDGE.AC.UK>
To: ABRIDLE <ABRIDLE@polaris.cv.nrao.edu>
Subject: Data reduction
Date: Tue, 3 Nov 92 18:40 GMT

I haven't heard from Peter recently. When I last talked to him, just before
I left for Italy, he was very keen that Steven Turner should take up your
offer and come to Charlottesville to work on the data.   The other
alternative was for me to go with him to Socorro, which would have introduced
a delay into the proceedings since I would be unable to clear a long enough
slot until early next year.   I E-mailed both of them to tell them about
the observations, but have not had a reply (possibly because they had the
problem with forwarding).   At that stage, I asked Peter to contact you
(and the VLA) directly about reductions. I tried to ring him today, but
failed, and will try again tomorrow.

I would like to make this project the excuse to visit myself, at least for
a short period (and have the money to do so provided that I do not claim
exorbitant subsistence). Perhaps I could come over for a week or so with
Steven and then leave him in Charlottesville to continue on his own with
your aid?

I spent most of my time in Bologna working with Paola Parma on jet:counterjet
intensity and collimation ratios. This was prompted by the work I have
been doing recently on the appearance of decelerating relativistic jets.
You are probably aware of the result that the brighter jet appears to be
better collimated. We had a close look at the data and established quite
convincingly that this is a property of the basal region: the collimation
and intensity are asymmetric over essentially the same range of distance from
the nucleus (0326+396 shows this effect very nicely). I think that this
effect could be produced by a relativistic pattern speed in some portion of
the jet base. I would very much like to try these ideas out on you soon
(I managed to convert Paola and Hans).

Would it be possible for us to use your intensity and collimation data for
3C 31 and NGC 315? These are technically in the B2 sample, but we do not
have the numbers. The data as used by Geoff Bicknell would be fine (we
need both jets, though).

Regards, Robert

Yes indeed, you'd be more than welcome both to visit and to dig into
my ancient data on 315/31. We've moved into a larger house this year,
and could readily accommodate both you and Steve Turner if you came
together. You'd probably be better off moving eventually into Alden
House (just up Observatory Hill from NRAO) if you both get deeply into
night-time data bashing, however. Our house is out near Ivy and thus a
bit less convenient as a base for dashing back and forth between
computers and real life.

The ideas re relativistic jet bases sound interesting. I'd be
delighted to get together with you around them!

Cheers, A.

From abridle Fri Nov 6 14:19:22 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["516" "Fri" "6" "November" "92" "14:17:46" "-0500" "Alan Bridle" "abridle " nil "11" "Re: Visit" "^From:" nil nil "11"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
      id AA18191; Fri, 6 Nov 92 14:17:46 -0500
Message-Id: <9211061917.AA18191@polaris.cv.nrao.edu>
References: <9211061808.AA04654@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: "Robert Laing, RGO, Cambridge" <"CAVAD::RL"@STARLINK.ASTRONOMY.CAMBRIDGE.AC.UK>
Subject: Re: Visit
Date: Fri, 6 Nov 92 14:17:46 -0500

Sounds like you are living the hectic life all right! I would not
dream of trying to fit a trip to the U.S. into the middle of that
schedule (even if my ears were air-worthy).

But please consider the invitation open to come through here and talk
jet symmetries/ reduce data/ give a talk etc. whenever it suits. As I
mentioned one thing we do have in our new house is lots of space for
visitors, and you would be more than welcome. Mary was/is looking
forward to seeing you again, it's been a long while ....

A.

Dear Alan,
   Could I come and visit for about a week towards the end of
Steven Turner's stay? Peter is encouraging him to stay on, I gather
(subject, I hope, to your approval) until the second week of December.
I am free from 10th until just before Christmas, so w/b 14th would be
possible. Would that suit you? I won't make any arrangements until I
get back from La Palma on Nov 17th.

Regards, Robert

From abridle Tue Nov 10 10:13:33 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["267" "Tue" "10" "November" "92" "10:11:52" "-0500" "Alan Bridle" "abridle " nil "7" "Re: Visit" "^From:" nil nil "11"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
      id AA18965; Tue, 10 Nov 92 10:11:52 -0500
Message-Id: <9211101511.AA18965@polaris.cv.nrao.edu>
References: <9211101506.AA20637@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: "Robert Laing, RGO, Cambridge" <RL@STARLINK.ASTRONOMY.CAMBRIDGE.AC.UK>
Subject: Re: Visit
Date: Tue, 10 Nov 92 10:11:52 -0500

That's just fine, you'll be more than welcome at our house.

I imagine you've got plans for Christmas, but if you haven't
you'd be welcome to stay over the holiday for some R & R also
(we would promise not to inflict snowshoe learning on you this time!).

Cheers, A.

Hello again Robert,

I've mentioned your proposed visit to Jay Lockman and Barry Turner,
who are delighted at the chance to see you again. Jay of course would
be further delighted if you would be interested/willing to give a
lunch talk. As you recall, these were on Tuesdays. Would you be here
and/or be in a fit state for a talk on the 15th or the 22nd? (15th
would catch more people because of pre-holiday departures, of course).
Just let me know whether you'll feel like doing this and Jay will hold
the spot for you.

Some social dates: Dec. 19th will be the NRAO/UVa Christmas party,
at the Birdwood Pavilion. You'll be invited. We'll also plan on a
get-together at our place that weekend. If you'll still be here on
the evening of the 20th (Sunday), that will probably be the easiest
for us to organise. We'll get something together whatever your
travel plans turn out to be.

Cheers, A.

Jay Lockman was aking me whether you had fixed your dates yet
and if so whether you could give him a date for a lunch talk.
Apparently his December schedule has gotten quite full now.
If Tuesdays would be awkward, how about a colloquium or an
informal talk on another day?

Cheers, A.

Dear Alan,
        I have found a reasonable flight from Gatwick via Baltimore
arriving at Charlottesville on Friday 11th at 1705 and leaving at
1750 on Monday 21st. The price we were quoted was substantially cheaper
than the United flight via Dulles and the connections are good.

I'll confirm the details when I have the tickets next week.

Cheers, Robert

From root Wed Dec 23 12:43:29 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["625" "Wed" "23" "December" "92" "17:43" "GMT" "\"Robert Laing, RGO, Cambridge\""
"\"CAVAD::RL\"@STARLINK.ASTRONOMY.CAMBRIDGE.AC.UK" nil "15" "Happy Christmas" "^From:" nil nil
"12"])
Received: from sun2.nsfnet-relay.ac.uk by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
    id AA30416; Wed, 23 Dec 92 12:43:28 -0500
Message-Id: <9212231743.AA30416@polaris.cv.nrao.edu>
Via: uk.ac.cambridge.astronomy.starlink; Wed, 23 Dec 1992 17:43:23 +0000
From: "Robert Laing, RGO, Cambridge" <"CAVAD::RL"@STARLINK.ASTRONOMY.CAMBRIDGE.AC.UK>
To: ABRIDLE <ABRIDLE@polaris.cv.nrao.edu>
Subject: Happy Christmas
Date: Wed, 23 Dec 92 17:43 GMT

Dear Alan,
        Thanks for the messages. And thank you again for the hospitality
and for rekindling my enthusiasm.

I'll get back to AL270 and counterjets in the first week of January,
desk clearing, Christmas and a short holiday in York being on the
programme in the mean time.

                Best wishes to you and Mary,
                        Robert

P.S. A minor favour which I forgot: could you ask the NRAO Admin whether they
still remember my social security number. I've forgotten it, and therefore
have to go through a tedious procedure to get hold of a new one in order to
avoid paying US tax on STScI expenses.

Hello Robert,

Hope you had a good holiday and not to much recovering is needed ...

I've been banging away on the 3C31 C Band calibration in the
background of other things, and I've finally made it work. I now have
images with about 40 microJy per beam rms at both 0.55 and 1.1 arcsec
FWHM and they will be very suitable for reanalysis of the collimation
properties. The images are now about a factor of four better in rms
noise/artifact level than the ones I first showed you when you arrived
here. This data set will give much better results than the old,
published one now. I'm making some polarization images to see how
they look, again in the background of doing other things.

I'd like to seriously follow up on our discussion about putting
these data, NGC315, M84 and 3C296 all together in one "FRI jet
base properties paper". I'll bang away on 3C31 until it's all dene,
then run through NGC315, then dig out M84. If you would have time
to dig into what you have on 3C296, this might be a good package
to complete some time in the spring? The possibility of comparing with
your model explicitly greatly increases my interest in this old topic!

I also ran into Everton Ludke, the Jodrell student whose MERLIN L_Band
proposal overlapped with ours. He's keen to have our 6cm datasets for
the compact sources, and I propose to dig these off my tapes and send
them to him. Id return we should get calibrated MERLIN data sets
eventually fr m him. I don't know if you've interacted with him
before, but some co-ordination at your end with the MERLIN bureaucracy
will doubtless be necessary. I'm presuming that you folks will be
think it o.k. for him to have our 6cm data before we see any of his ...

I'm going to take David Hough up on his offer to try to finish up the
6cm counterjet paper when he comes here in March. I'll try to get
everything still need on the data side finished up in time for that.
I think we left it that you were going to write the "comparison with
Laing" hot spot discussion, and also talk to peter S. about putting
the depolarization asymmetry into the 6cm paper and having him join
the authorship. Have you seen/heard_from him since you got back?

On another matter, I heard today that Queen's University has become
the owner of Herstmonceux castle (how's that for an odd coincidence)
by dint of one of its benefactors having come up with the $$$ to buy
it. I gather there is much talk about using it as a base for
Europe-oriented international programs, of which they already have
several.

We greatly enjoyed finishing up that lovely cheese that you brought us over the holidays. Thanks again, and I hope we'll be able to get together again before too long ...

Cheers, A.

Dear Alan,
        I have indeed talked to Peter. He got quite excited about the
spectral index - intensity plots and has gone away to think about them.
He did not feel that he ought to be an author on the counterjet paper
(I did point out that he was more awake than the other sleeping partners)
but may provide some comments (no promises: he is senoir examiner for
Part II this term). We also discussed Stephen's plans. Peter is somewhat
more negative than we were about Stephen, but we agreed that there was a
good MSc thesis in prospect. There may be a problem if Stephen does not
find a place at medical school and wants to stay on for a further year.
I have suggested firstly that Stephen has a first go at drafting the
observational parts of a paper and secondly that he comes over to
RGO once a week to discuss map analysis etc.

I'll send a redraft of the 2 hot-spots sections in the next day or two,
as we discussed.

Good news about 3C 31. I will look into the possibility of getting a
NATO collaborative grant and will contact Paula about this.

Any luck over my social security number?

Cheers, Robert

P.S. I hope no messages got bounced over Christmas: disk space got filled up
again.

Paddy Leahy rang me about the status of the MERLIN observations. After a
complicated process which I failed to comprehend (would you believe that the
TAC said that because 4 groups wanted to observe 3C 9 they would allocate
no time to it?) all three of our objects will be observed, but the data will
also go to other people (primarily Ludke, whom I keep missing at Jodrell).
I said, as you did, that we would be happy to provide 6cm, short spacings, etc.
provided that we could get spectral index maps out. There should be no
problems there.

I will resurrect 3C 296 and remove its stripes fairly soon.

Cheers , Robert

More on 3C31:

I've taken advantage of the fact that Harvey Liszt's drawspec program
can now read FITS images directly and have
 done a gonzo slicefit on a
couple of hundred trreansverse profiles across the innermost 40" of
the jet and counterjet of 3C31 at 0.55" FWHM resolution. Harvey's
program lets you fit polynomial baselines and multiple gaussians, etc
so it can deal with the off-source non-idealities much better than AIPS.

Results are in excellent agreement with the published (November 1980)
FWHM data but show much more detail.

Two potentially important points are emerging, interesting enough that
we might want to push this one out on its own as a "test case" and
then follow up with M84, 3C296, NGC315 ....

1. Most of the transverse profiles in the first 14" of the main jet
require a two-component Gaussian fit: the center of the profile is too
peaked, or the wings ar too broad, for a good single-component fit.
Beyond 14", single component Gaussian fits are really rather good.
Before about 10", the narrower Gaussian in the center of the profile
dominates. Between about 10" and 14", this narrow component "fades
out".

2. The counterjet is first detected with good signal-to-noise
about 9" out and stays nears its initial peak intensity
while almost tripling in width between 9" and 25" out. Thus, the
regime in which the counterjet first appears convincingly out of
the noise is just the regime in which the central narrow feature
fades out on the jet side.

3. The counterjet has a collimation "pause" between about 25" and 35"
out in which it does not expand significantly. You can actually see a
sign of this in the old collimation plot, but you might not have
believed it because of the 5" sampling. The peak intensity of the
counterjet increases by about 50% during this pause, producing a
"spike" in the I-Phi plot that is very striking. There does not seem
to be a cooresponding "pause" on the main jet side.

4. The B-parallel region extends about 6" along the axis of the main
jet, terminating at the end of a sharp drop in the peak intensity of
the main jet, but a bit before the transverse profiles become
single-Gaussian.

5. The counterjet is B-perpendicular as soon as this can be measured.
There is no sign of an initial B-parallel region, but the main jet is

well into its own B-perpendicular regime by the place where the
counterjet polarization first becomes measurable.

I'll work up some plots of all of this to send you as postscript
files and maybe as the first draft of how we might show all of this.

I'm very pleased by the way this has finally converged. Just needed
eight iterations of self-cal with a 2048*4096 image, followed by
a core-CLEAN, jet-VTESS composite deconvolution to bring out all the
features properly!   Now why didn't I just do all that in the
ModComp 10 years ago?

Now I'm *really* keen to hit this source hard with the full sensitivity
and resolution of the VLA! Who should we talk to about getting all
of this into the next proposal attempt/ Paola? Rick?

Cheers, A.

P.S. did you get the message re Soc.Sec.No the other day?

I just realised I said "two" important points were emerging then sent you
a list of five results without saying what the *two* are!

The joys of on-line typing ...

I think the two points are (a) that the main jet does indeed have
evidence of non-Gaussian transverse structure in, and slightly
beyond the region that is dominated by one-sided B-parallel
features, (b) that there is interesting I-phi and phi-theta
structure to compare on the two sides.

I'm about to make some folded-over plots to do these comparisons
carefully and will keep you posted about conclusions.

So far, looks like a rich one for exploring the details of
your model ....

A.

Excellent! The inner jet region ought to be straight enough to try
rotating the map by 180 deg and dividing by itself. I developed a
procedure to do this (including upper limits) which went as follows:

(1) Create a 2-sigma (or whatever) constant map.

(2) Make a map which is 0 wherever the source has I > 2 sigma using the
clip and zero-blanking options in COMB.

(3) Make a map where areas with I < 2 sigma are set to zero. Add this to
the map from step 2. This produces an image which is
max(I,2*sigma).

(4) Rotate by 180 deg about the core position.

(5) Divide rotated/unrotated, clipping on the rotated image only at
2 sigma + a little.

This gives a map which on the original main jet side has
counter-jet/jet where both have I > 2 sigma and a lower limit to this
quantity if I(main jet) < 2 sigma. It is balnked wherever both sides
have I < 2 sigma (I should have said that step 5 uses magic value blanking).
On the original counter-jet side, the map has jet/counter-jet where both
have I > 2sigma and a lower limit if the jet is brighter than 2 sigma but
the counter-jet isn't. So taking 1/map gives values and upper limits
to counter-jet/jet. I then made grey-scales of c-jet/jet with a single
2-sigma contour plotted to show the division between values and limits in
the 2 cases. Phew.

Needless to say
, the coordinate system has a propensity to end up
backwards.

3C 31 ought to$be the best case yet for 2D c-jet/jet maps.

The tendency of the main jet to show a narrow core is extremely interesting.
In theory, one ought to be able to use a map of c-jet/jet to deduce (or,
at least, constrain) the velocity profile since, on the assumption of
strict symmetry, the ratio depends on the integral of the Doppler factor
through the jet. I don't think we are quite at the integral equation stage
here, but I could try fitting some simple models.

You will recall that I was worried about 0206+35 because it seemed that the
counter-jet was wider than the main jet (in an isophotal, as well as FWHM

sense). This may be an instrumental effect, because the map in question was pure A-array and the source has bright lobes. 3C 31 ought to be much better sampled and, in any case, the jets aren't surrounded by lobe emission. So, is there any sign of this effect?

I look forward to seeing the data.

Regards, Robert

P.S. Thanks for the Socsoc number. I should be able to sidestep some tedious bureaucracy as a result.

From root Thu Jan 14 12:47:37 1993
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["377" "Thu" "14" "January" "93" "17:47" "GMT" "\"Robert Laing, RGO, Cambridge\""
"RL@STARLINK.ASTRONOMY.CAMBRIDGE.AC.UK" nil "9" "3C 31 proposal" "^From:" nil nil "1"])
Received: from sun2.nsfnet-relay.ac.uk by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
    id AA30498; Thu, 14 Jan 1993 12:47:34 -0500
Message-Id: <9301141747.AA30498@polaris.cv.nrao.edu>
Via: uk.ac.cambridge.astronomy.starlink; Thu, 14 Jan 1993 17:45:41 +0000
From: "Robert Laing, RGO, Cambridge" <RL@STARLINK.ASTRONOMY.CAMBRIDGE.AC.UK>
To: ABRIDLE <ABRIDLE@polaris.cv.nrao.edu>
Subject: 3C 31 proposal
Date: Thu, 14 Jan 93 17:47 GMT

The prime movers (although possibly not the only ones) on the 3C 31
proposal were Gabriele Giovannini, Luigina Feretti and Rick Perley.
I haven't seen the text. It might be as well to get in touch with Rick
in the first instance. You have an address for him, presumably?

Ed Fomalont said that they had got some fraction of the time (for 3C 449,
he thought).

Cheers, Robert

I've started doing some fold-overs, though not the jumbo all-singing
all-dancing one you've just sent me the recipe for. I'm going
to have to sit down with a pot of strong coffee to figure that one
out ...

But I think from simply folding over contour maps and and FWHM
plots I can say that

(a) the FWHM expansion of the counterjet is only marginally
faster than that of the main jet. The kicker is that the
counterjet plot shows a lot of internal scatter, due partly
to noise and partly to internal structure, and the
jet collimation plot points nicely through the lower part
of the counterjet scatter in the region 10" to 20" from
the core. Beyond 20" from the core, the Phi-Theta diagrams pretty
much overlap.

(b) Both the main jet and the counterjet spread more
slowly beyond 20" from the core. For the counterjet, the
data suggest a long collimation plateau out to about
35" from the core, with no net expansion
 and (maybe)
slight net contraction. For the main jet, we have
a more oscillatory pattern, with alternating contraction
and expansion. On the jet side, the net expansion
wins out a little more clearly. But you could say that
both jet and counterjet show some sign of a collimation
"impediment" turning on around 20" out.

(c) from simply folding a contour map across itself on
a crease through the core perpendicular to the jet axis,
I would say that, if anything, the isophotal widths are
slightly wider in the *main* jet in the region around
15" out. Certainly no sign of the counterjet being
absolutely wider.

I'll send you the new collimation plot as a file as soon
as I figure out how best to show the transition region
between 1-cpt and 2-cpt Gaussian fits. I guess one plot
that's of interest is to show what we would get if we just
charged ahead and fitted a single Gaussian everywhere, as
we do for less well-resolved sources. Another is to show the
narrow and broad components separately, on both the Phi-theta
and I-Phi plots. I'm kicking things around in my plotting
program now to find a suitable display, and also to try to

understand the phenomena myself.

What follows is a hybrid: for the counterjet and outer main
jet, it's the single component fit. For the inner main jet,
where the broad component can basically be thought of just`
as baseline confusion for the narrow one, it's the narrow
component only. In the transition region, it's blank!

Final note: from this diagram, you can see that the initial
B-parallel regime (out to 6") of the main jet is *clearly*
the region that corresponds to a *slow* initial expansion
of the main jet. This is very reminiscent of NGC315 ...

I think we have a little gold mine here ..

A.

Hello again Robert,

I've been away from 3C31 for a while cleaning up some stuff on the
quasar work (including making a tape of the spectral images that
has them all sorted into a rational order, making the RM images
where appropriate, and getting the UV data sent off to Everton
Ludke for 3C9, 208, 336 and 432).

I've now gone through your recipe for making a sidedness image
for the first time, and have a reasonable crack at the result.
I think I will do it again with 3-sigma blanking in this case
as there are a few artifacts, but the bottom line is that you can
clearly see a trough running up the main jet axis in the
counterjet/jet ratio, i.e. there is good evidence that the
edges of the jet have a counterjet-jet ratio that is closer to
unity than it is on the centerline.

This fits nicely with what I found from the collimation
analysis and the profile fitting. Shall I write the sidedness
image out somewhere in FITS format for you to try ftp-ing?

Cheers, A.

From root Wed Feb 3 15:55:40 1993
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["982" "Wed" "3" "February" "93" "19:15" "GMT" "\"Robert Laing, RGO, Cambridge\""
"\"CAVAD::RL\"@STARLINK.ASTRONOMY.CAMBRIDGE.AC.UK" nil "18" "3C 31" "^From:" nil nil "2"])
Received: from sun2.nsfnet-relay.ac.uk by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
    id AA22204; Wed, 3 Feb 1993 15:55:37 -0500
Message-Id: <9302032055.AA22204@polaris.cv.nrao.edu>
Via: uk.ac.cambridge.astronomy.starlink; Wed, 3 Feb 1993 19:13:04 +0000
From: "Robert Laing, RGO, Cambridge" <"CAVAD::RL"@STARLINK.ASTRONOMY.CAMBRIDGE.AC.UK>
To: ABRIDLE <ABRIDLE@polaris.cv.nrao.edu>
Subject: 3C 31
Date: Wed, 3 Feb 93 19:15 GMT

Dear Alan,
        I got the file without any problems. The image looks interesting
(and more or less as expected!) As you said, there don't appear to be
any significant regions where the counterjet is physically wider than the main
jet and the trough in the middle is pretty clear. John Biretta had a way
of binning up profiles along radii from the nucleus within AIPS which might
be useful to show the average. not sure how he did this (one of the
interpolation progs - perhaps HGEOM). I'll see whether I can work out what
to do. I think that this is by far the best of the 2D images, since I'm
not happy about the coverage on 0206+35.

Cheers, Robert

P.S. I had a message from Geoff Bicknell today: he now accepts that at least
some of the jet bases could be relativistic (I'm not sure what changed his
mind, but I think one point was that his energy balance arguments used spectral
gradient timescales which later turned out to be fictitious). Bandwagon now
rolling!

From root Thu Feb 4 12:17:18 1993
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
    ["616" "Thu" "4" "February" "93" "15:30" "GMT" "\"Robert Laing, RGO, Cambridge\""
"\"CAVAD::RL\"@STARLINK.ASTRONOMY.CAMBRIDGE.AC.UK" "<9302041716.AA28486@polaris.cv.nrao.edu>"
"13" "3C 31 transverse profile" "^From:" nil nil "2"])
Received: from sun2.nsfnet-relay.ac.uk by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
        id AA28486; Thu, 4 Feb 1993 12:16:59 -0500
Message-Id: <9302041716.AA28486@polaris.cv.nrao.edu>
Via: uk.ac.cambridge.astronomy.starlink; Thu, 4 Feb 1993 15:38:19 +0000
From: "Robert Laing, RGO, Cambridge" <"CAVAD::RL"@STARLINK.ASTRONOMY.CAMBRIDGE.AC.UK>
To: ABRIDLE <ABRIDLE@polaris.cv.nrao.edu>
Subject: 3C 31 transverse profile
Date: Thu, 4 Feb 93 15:30 GMT

Dear Alan,
        In order to produce an averaged profile across the sidedness
map, I ran PGEOM with APARM(1) = core x, APARM(2) = core y and
APARM(7) = -1. This produced a map of angle against radius. The region
with the central trough has an approximately constant opening angle and
therefore has parallel sides on the r - theta plot. I then ran XSUM to
average over radius and derived a fairly smooth profile varying from
about 0.8 at the edge to 0.25 in the middle.

I will have a look to see whether I can get anything out of the upper limits
around the base region next.

        Cheers, Robert

My goodness, a scientific use for PGEOM ...

is this a "first", or do you have others?

Seriously, though, it does assume that the sidedness profiles are
self-similar all the way out, and must be doing a rather odd weighting
of the pixels in the inner jet relative to those further out? I
presume we should be looking for some evidence that the sidedness
profile is changing shape, to make a detailed test of the model?

If the image transfer was straighforward and not too time-consuming
for you, would you like some of the other data that way?

I am tempted to take a crack at the L Band data from the same
period, although the resolution is worse it might be fun to
see whether the gross sidedness parameters depend on frequency.

I corresponded briefly with Rick about the fact that we were doing all
this with the old C-band dataset. he had forgotten that it existed,
and was very keen that we try again to get a proposal for 3C31 at 8
GHz past the VLA referees. I mentioned to him that you were in close
contact with the Bologna folk, so that everyone previously involved
would continue to be. He was very happy with that idea.

Cheers, A.

Dear Alan,
      Thanks for the 3C 31 message, which got through correctly.
You are quite right about PGEOM. In order to get equal weight for
profiles along the jet, it is necessary to rescale. I didn't manage
to work out how to do this. Plus it only works for a precisely conical
jet. And probably a few things I hadn't thought of. I think that we
will have to do something a bit better with the individual profiles.
I was trying to smooth out some of the noise, but it may be that a
better approach is to convolve with a beam which is elongated along the
jet, so as to avoid losing spatial information.

The transfer took about 300s, so is quite feasible for other maps (not at
the moment, though, as the AIPS FITS area has suffered an accident and
we are waiting for surgery on the disk).

I'll contact the Bologna people about 3C 31. Did they get the time for 3C 449?

By the way, Geoff Bicknell now believes that jet bases could be relativistic.
Not entirely sure why from his message.

Cheers, Robert

Hello Robert,

This is to pick your brain for any tricks you may have learned
re array cross-calibration. My student has D array and B array
data on an FRII galaxy with C array data coming in the pipeline.
He's trying to get ahead on the B array self-calibration using the
D array data to help with the "cereal bowl" effect and it's
pretty clear that the core has varied. After correcting for this as
best we can with UVSUB and cross-calibrating on the B array
model he still has the sympton you mentioned to me as characteristic
of the amplitude calibration problems in this case : a low level
halo around the core (plus some symmetric sidelobes that amplitude
self-cal doesn't want to correct).

Did you learn any tricks for dealing with this situation, probably
a mix of additive and multiplicative corrections being needed to
fix it. We can obviously take a close look at sidelobes structures
and flux densities of compact features outside the core to look
for gross problems, but I'm wondering if you've learned any magic
that can help this case (other than waiting for the C array that
is to come!).

All the best,

Alan

From root Wed Feb 24 19:18:15 1993
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
    ["218" "Wed" "24" "February" "93" "18:02" "GMT" "\"Robert Laing, RGO, Cambridge\""
"\"CAVAD::RL\"@STARLINK.ASTRONOMY.CAMBRIDGE.AC.UK" "<9302250018.AA33644@polaris.cv.nrao.edu>"
"4" "NATO" "^From:" nil nil "2"])
Received: from sun2.nsfnet-relay.ac.uk by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
    id AA33644; Wed, 24 Feb 1993 19:18:11 -0500
Message-Id: <9302250018.AA33644@polaris.cv.nrao.edu>
Via: uk.ac.cambridge.astronomy.starlink; Wed, 24 Feb 1993 18:10:15 +0000
From: "Robert Laing, RGO, Cambridge" <"CAVAD::RL"@STARLINK.ASTRONOMY.CAMBRIDGE.AC.UK>
To: ABRIDLE <ABRIDLE@polaris.cv.nrao.edu>
Subject: NATO
Date: Wed, 24 Feb 93 18:02 GMT

Dear Alan, Did you get my message about NATO collaborative grants? You
may have found rgosc unresponsive since it has been suffering from a
server upgrade - could you reply to this address for a bit?
 Cheers, Robert

Hello Robert,

I got your message but I've been laid up at home for almost a week with
the flu. I'm still there, but at least feeling well enough to start
going through my E-mail over the modem.

I agree that this is a good idea and I think we should zero in on
testing detailed model of FRI jets using VLA data on sidedness,
collimation and polarization. Your message had all the vital
ingredients named, I think.

Regarding timing, I'm heading out to NM for three weeks starting on
March 19th (Friday), but of course can stay in touch from there.

What is the proposal format? What has to be provided, and to whom?

I'll have to ask when I get back to the lab (probably tomorrow)
about whether this is the sort of thing that needs to be passed
through the NRAO/NSF bureaucracy for approval so far as I am
concerned. Do you have any background info about these grants
that you could FAX across -- it might be useful to be able to
show the NRAO admin something about the grant program early
on in case their approval or cosignature is needed.

Sorry to have been out of touch -- this latest flu bug has been
a really mind-numbing one!

Cheers, A.

From root Sun Sep 26 21:18:53 1993
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
     ["762" "Mon" "27" "September" "93" "02:18" "BST" "Robert Laing" "rl@mail.ast.cam.ac.uk " "<m0oh7Eq-0001N1C@cast0.ast.cam.ac.uk>" "14" "Reference" "^From:" nil nil "9"])
Received: from cast0.ast.cam.ac.uk by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
        id AA20205; Sun, 26 Sep 1993 21:18:52 -0400
Received: by cast0.ast.cam.ac.uk (UK-Smail 3.1.25.1/2)
  id <m0oh7Eq-0001N1C@cast0.ast.cam.ac.uk>; Mon, 27 Sep 93 02:18 BST
Message-Id: <m0oh7Eq-0001N1C@cast0.ast.cam.ac.uk>
From: rl@mail.ast.cam.ac.uk (Robert Laing)
To: abridle@polaris.cv.nrao.edu
Subject: Reference
Date: Mon, 27 Sep 93 02:18 BST

Dear Alan,
        My masters are putting me forward for an internal promotion this
year, and I need to give some referees. Would you be willing to perjure
yourself on my behalf? The post in question is grandly named "Individual Merit"
and is a means of promoting people without giving them additional managerial
responsibility. In my case, this implies a roughly half-and-half split between
astronomy and technology R&D (a major increase in research time, as well as
more money). The snag is that it is extremely competitive (it's across all
of the research councils, not just SERC). I'd obviously need you to give
an opinion on the astronomy, ignoring anything to do with telescopes.

Any kind words gratefully appreciated.

        Regards, Robert

From abridle Mon Sep 27 08:18:12 1993
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["180" "Mon" "27" "September" "1993" "08:18:03" "-0400" "Alan Bridle" "abridle " nil "8" "Re: Reference" "^From:"
nil nil "9"])
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
        id AA32259; Mon, 27 Sep 1993 08:18:03 -0400
Message-Id: <9309271218.AA32259@polaris.cv.nrao.edu>
References: <m0oh7Eq-0001N1C@cast0.ast.cam.ac.uk>
From: abridle (Alan Bridle)
To: rl@mail.ast.cam.ac.uk (Robert Laing)
Subject: Re: Reference
Date: Mon, 27 Sep 1993 08:18:03 -0400

Hello Robert,

Yes, I'd be very happy to write on your behalf, and won't need to
perjure myself to make your case, either!

Also, just to note that I got the 3C31 draft o.k.

A.

Hi Robert,

I'll be getting to Socorro some time towards the end of Saturday Nov 13th
(driving up from Las Cruces) and will be staying there a couple of weeks.

Looking forward to getting together with you again!

Cheers, A.

Hi Robert,

How did the commissioning run go on La Palma?

Do you still think you may be able to make it across to C'ville while Peter
is here? We hope so.

A.

From root Mon Jan 24 17:27:20 1994
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["29" "Mon" "24" "January" "94" "22:27" "GMT" "Robert Laing" "rl@mail.ast.cam.ac.uk " nil "1" "3C 31" "^From:"
nil nil "1"])
Received: from cast0.ast.cam.ac.uk by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
        id AA40223; Mon, 24 Jan 1994 17:27:16 -0500
Received: by cast0.ast.cam.ac.uk (UK-Smail 3.1.25.1/2)
  id <m0pOZkX-0001PYC@cast0.ast.cam.ac.uk>; Mon, 24 Jan 94 22:27 GMT
Message-Id: <m0pOZkX-0001PYC@cast0.ast.cam.ac.uk>
From: rl@mail.ast.cam.ac.uk (Robert Laing)
To: abridle@polaris.cv.nrao.edu
Subject: 3C 31
Date: Mon, 24 Jan 94 22:27 GMT

Good letter. Cheers, Robert

From root Mon Jan 31 10:11:35 1994
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
    ["318" "Mon" "31" "January" "94" "15:11" "GMT" "Robert Laing" "rl@mail.ast.cam.ac.uk " "<m0pR0Hf-0001QQC@cast0.ast.cam.ac.uk>" "8" "Re: VLA proposal" "^From:" nil nil "1"])
Received: from cast0.ast.cam.ac.uk by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
        id AA01343; Mon, 31 Jan 1994 10:11:29 -0500
Received: by cast0.ast.cam.ac.uk (UK-Smail 3.1.25.1/2)
  id <m0pR0Hf-0001QQC@cast0.ast.cam.ac.uk>; Mon, 31 Jan 94 15:11 GMT
Message-Id: <m0pR0Hf-0001QQC@cast0.ast.cam.ac.uk>
From: rl@mail.ast.cam.ac.uk (Robert Laing)
To: abridle@polaris.cv.nrao.edu
Subject: Re: VLA proposal
Date: Mon, 31 Jan 94 15:11 GMT

As I recall, we were thinking about B-array data at 1.4 GHz. I have put
together something along these lines. We reckoned that 3C 135 and 403
would need B array: has anyhting changed that might affect this (e.g.
these objects no longer being thought to have jets?)

Cheers, Robert

P.S. Any feedback about 3C 31?

Hi Robert,

If these are the only two sources from Adam's sample for which
there were no B config data in the VLA archive, then these
are indeed the ones for which a proposal for this deadline is
needed. Having seen some of the images with only brief
observations in the smaller configurations, it seems that
we may need more time in them to fill up the uv plane better
and to get spectral information for the weak extended
structures. We may also need A configuration data for
all of them at L Band to sort out what is going on near
the hot spot regions. But Peter and I thought that all
of those things would best be discussed with you and his
student once he is back. So for the moment it is
just "B configuration completion" that desreves high priority.

Cheers,
A.

Alan,
    These are the objects in question, I bhlieve. The only one about which I'm
unsure is 3C 277.3, for which the published map appears to be A array only
(it's too early to appear in the archive). I guess that you know more about
this one than I do. The remaining data appear mostly to have B and C array
observations. I think that the s/n and coverage are adequate, but it is a bit
difficult to tell from some of the plots.

So, I'm fairly sure that there isn't anything much requiring B array, but
please feel free to add things. In particular, I'd value advice on 3c 277.3.

Summary of data

3C 111	B+C	APRW	OK
3C 135	B+C	Current proposal	
3C 184.1	B+C	Leahy & Perley	OK - ?jet
3C 192	B+C	RAL	OK - ?jet
3C 223	B+C	Leahy & Perley	OK - ?jet
3C 223.1	B+C	Spangler	Needs C conf ?jet
3C 277.3	A+?	Van Breugel et al.	? need B
3C 285	B+C	APRW	OK
3C 303	A+B	Leahy & Perley	OK
3C 321	B+C	APRW	Can't see bridge
3C 382	B+C	Leahy & Perley	OK
3C 388	A+B	Roettiger et al.	OK
3C 390.3	B+C	Leahy & Perley	OK
3C 403	B+C	This proposal	
3C 405	A+B	Carilli et al.	OK
3C 445	Too big to map at 8 GHz with VLA - ignore		
3C 452	B+C	RAL	OK

APRW: some of Leahy & Williams (1984), Alexander & Leahy (1987), Leahy, Pooley
& Riley (1986), which use overlapping datasets. All appear to have some
C configuration data. The table in Leahy, Pooley & Riley
gives the clearest account of the observing configuration.

Cheers, Robert

Dear Alan & Peter,
            I'm slightly concerned about the non-optimal scheduling of
this proposal - it would be better as part of a longer one. It would be nice
to be able to get at 3C 286, to do a proper polarization calibration and to
get a large range of hour angles. Unfortunately, I don't think that these
sources on their own justify a long run (and the suggested times may be pushing things a bit). Oh well.

I'm off home now - I'll check my e-mail tomorrow morning.

Cheers, R.

P.S. Home phone is 44 223 327326 in case of problems.

Hello Robert and Jane,

Peter and I have gone over Robert's draft for our B configuration
proposal for the Feb.1 deadline and have made a few mostly cosmetic
changes to the text and one fairly significant change to the
strategy.

Basically we have become concerned about the effect of partial u,v
coverage on the existing L band images and think we should go for
good coverage on these B configuration observations of 3C135 and
3C403. With that in mind, we've stretched the time asked for out
to 12 hours so we can run it all as one session calibrated on
3C286. We also think we will need more C array time for sources
for which we have some archive data already, and thus have
deferred asking for the C array time until next proposal deadline
when we can propose a more integrated set of observations for
the whole sample.

Robert, thanks for getting the first draft out this evening and
I hope this strategy change will allay your fears about coverage.

Jane, hope there is still time for you to take a look at this
before it goes in.

3 files follow ... the proposal text, p.1 of the cover page,
then p.2 of the cover page. We will hand this in before I
take Peter to his plane (around 3 pm our time, 8 pm yours,
Feb 1st!).

Cheers,

A.

Robert Laing writes:
>
> P.S. Any feedback about 3C 31?

No, but we can't expect any until the referees have seen the letter.
I gather that the scheduling committee always sends such letter to
the referees for their comments. I did mention the matter directly
to Ed Fomalont and he thought that they might simply have
misunderstood something. I'm a little surprised by that in this case,
but then I always think our proposals are models of clarity!

I did hear from Rick that he also thought the letter was appropriate
and necessary.

So we'll see ...

A.

Alan,
    Thanks. One thing slipped under my guard on this: I forgot to check with
Luigina about the 6cm phased array data, which we hoped to have had analysed
before the Feb 1 deadline. I don't suppose that we know significantly more
than we did a few months ago, but you never know.

I'm surprised that the committee missed the point: they have swallowed similar
stuff before without complaint.

Cheers, R

Dear Alan,
        A couple of things which might interest you:

- I just heard from Andy Lawrence that 3C 22 has a broad H alpha line, so
the only jetted source in the Fernini et al. paper is indeed a broad-line
radio galaxy.

- Gabriele Giovannini and Luigina Feretti have mapped the B configuration,
6cm phased array stuff on 3C 31. The maps look good, albeit in need of
short spacings. The counterjet can be seen almost al the way into the core.
My models aren't entirely happy, since the counterjet
 has got transverse B
at its centre almost all of the way to the core. I'm inclined to wriggle out
of this by saying that the main jet has got intrinsically more parallel-field
emission, but fail to convince myself.

Cheers, Robert

From abridle Tue Apr 12 17:25:29 1994
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["312" "Tue" "12" "April" "1994" "17:24:36 "-0400" "Alan Bridle" "abridle " nil "10" "Misc" "^From:" nil nil "4"])
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
      id AA42640;
Tue, 12 Apr 1994 17:24:36 -0400
Message-Id: <9404122124.AA42640@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: rl@rgosc.ast.cam.ac.uk
Subject: Misc
Date: Tue, 12 Apr 1994 17:24:36 -0400

Three things I thought I'd mention:

1. The quasar paper has been resubmitted.
2. We got 3 by 8 hrs in B array for 3C31, so the letter did something,
   even though the last mailing from the scheduling committee does
   not make this clear.
3. The spectral-asymmetry proposal got very good reviews.

Cheers, A.

From abridle Fri May 20 16:45:45 1994
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["3145" "Fri" "20" "May" "1994" "16:45:41" "-0400" "Alan Bridle" "abridle " nil "117" "forwarded message from
Mail Delivery Subsystem" "^From:" nil nil "5"])
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
    id AA23475; Fri, 20 May 1994 16:45:41 -0400
Message-Id: <9405202045.AA23475@polaris.cv.nrao.edu>
From: abridle (dlan Bridle)
To: jdt@mrao.cam.ac.uk
Subject: forwarded message from Mail Delivery Subsystem
Date: Fri, 20 May 1994 16:45:41 -0400

Hello Jane.

I'm sorry to bother you with this but Robert sent me a message
asking me to resend some of my rejected mail to him to see if
it is still rejected.

I did, and it was. So could you convey the attached message
to him by whatever means is available, so he can take a
look at the "evidence"?

Thanks a bunch,

Alan

------- Start of forwarded message -------
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["2185" "Fri" "20" "May" "1994" "16:21:21" "-0400" "Mail Delivery Subsystem" "MAILER-DAEMON " nil "90"
"Returned mail: Cannot send message for 3 days" "^From:" nil nil "5"])
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
    id AA17990; Mon, 16 May 1994 18:50:05 -0400
Message-Id: <9405202020.AA17990@polaris.cv.nrao.edu>
From: MAILER-DAEMON (Mail Delivery Subsystem)
To: abridle
Subject: Returned mail: Cannot send message for 3 days
Date: Fri, 20 May 1994 16:21:21 -0400

  --- The transcript of the session follows ---
421 rgosc.ast.cam.ac.uk.tcp... Deferred: A remote host did not respond within the timeout period. during user open with
rgosc.ast.cam.ac.uk

  --- The unsent message follows ---
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
    id AA15943; Tue, 17 May 1994 15:51:59 -0400
Date: Tue, 17 May 1994 15:51:59 -0400
From: abridle (Alan Bridle)
Message-Id: <9405171951.AA15943@polaris.cv.nrao.edu>
To: rl@rgosc.ast.cam.ac.uk
Subject: forwarded message from Alan Bridle

- ------- Start of forwarded message -------
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["1021" "Fri" "13" "May" "1994" "11:26:17" "-0400" "Alan Bridle" "abridle " nil "65" "Preprint distribution"
"^From:" nil nil "5"])
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
    id AA22691; Fri, 13 May 1994 11:26:17 -0400

Here's the list of people who have received preprint copies in the
(right-way-up) spiral-bound form

========================

Aller, Margo
Antonucci, Ski
Auruch, Ian
Baganoff, Fred (UCLA)
Baker, Jo
Barthel, Peter
Biretta, John
Borne, Kirk (STScI)
Browne, Ian
Contopoulos, John
Conway, John
De Young, Dave
Dey, Arjun
Fletchere Andre (MIT)
Gopal Krishna
Gower, Ann
Hardee, Phil
Iping, Rosina
Kollgaard, Ron
Leahy, Paddy
Lucas, Ray (STScI)
Ludke, Everton
Marcaide, Jon
Mattox, John (NASA.GSFC)
McNamara, Brian
Morrison, Phil
Neff, Susan
Owen, Frazer
Ozernoy, Leonid
Perley, Rick
Potash, Bob
Punsly, Brian
Robson, Ian
Sadun, Alberto
Vermeulen, Rene
Wardle, John
Worrall, Diana
West, Michael
Wiita, Paul
Wills, Bev
Wrobel, Joan
Xu, Wenge (Caltech)

NRAO libraries (4) and preprint distribution (200)

JPL preprint distribution (via Dave Hough)
Colin Lonsdale (3 copies for Haystack)

====================

original submission version to

Norman, Mike
Readhead, Tony
Scheuer, Peter
Wardle, John (he now has both versions)

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

From root Tue May 24 05:38:43 1994
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
    ["220" "Tue" "24" "May" "1994" "10:36:45" "+0100" "Robert Laing" "rl@mail.ast.cam.ac.uk"
"<Pine.3.05.9405241045.A16128-8100000@rgosc.ast.cam.ac.uk>" "8" "Sigh" "^From:" nil nil "5"])
Received: from cast0.ast.cam.ac.uk by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
    id AA34015; Tue, 24 May 1994 05:38:42 -0400
Received: from rgosc.ast.cam.ac.uk [131.111.69.16]
    by cast0.ast.cam.ac.uk with smtp
    (Smail-3.1.28.1) id m0q5swW-0001PhC; Tue, 24 May 94 10:38 BST
Received: by rgosc.ast.cam.ac.uk
    (Smail-3.1.28.1) id m0q5swV-0001vXC; Tue, 24 May 94 10:38 BST
Message-Id: <Pine.3.05.9405241045.A16128-8100000@rgosc.ast.cam.ac.uk>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@mail.ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: Sigh
Date: Tue, 24 May 1994 10:36:45 +0100 (BST)

Dear Alan,
        Could you try the generic mail address rl@mail.ast.cam.ac.uk,
please? I guess that something has changed at this end (o/s upgrade?),
since my machine has been up most of the time.

Cheers, Robert

From root Fri Sep 23 23:51:05 1994
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
    ["453" "Sat" "24" "September" "1994" "04:50:30" "+0100" "Robert Laing" "rl@mail.ast.cam.ac.uk"
"<Pine.3.05.9409240425.A27273-9100000@rgosc.ast.cam.ac.uk>" "14" "Re: Observing" "^From:" nil nil "9"])
Received: from cast0.ast.cam.ac.uk by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
        id AA27115; Fri, 23 Sep 1994 23:51:05 -0400
Received: from rgosc.ast.cam.ac.uk [131.111.69.16]
        by cast0.ast.cam.ac.uk with smtp
        (Smail-3.1.28.1) id m0qoO8d-0001LKC; Sat, 24 Sep 94 04:51 BST
Received: by rgosc.ast.cam.ac.uk
        (Smail-3.1.28.1) id m0qoO8d-0001vhC; Sat, 24 Sep 94 04:51 BST
Reply-To: Robert Laing <rl@mail.ast.cam.ac.uk>
In-Reply-To: <9409231609.AA30681@polaris.cv.nrao.edu>
Message-Id: <Pine.3.05.9409240425.A27273-9100000@rgosc.ast.cam.ac.uk>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; CHARSET=US-ASCII
From: Robert Laing <rl@mail.ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Cc: Jane Dennett-Thorpe <jdt@mrao.cam.ac.uk>
Subject: Re: Observing
Date: Sat, 24 Sep 1994 04:50:30 +0100 (BST)

Dear Alan,
       It's not impossible that I could make it to Socorro in November.
I'll have to chase up funding. I'm in La Palma at the moment, up to
my ears in telescope work, but will be back in the UK on 30th.
I have cleared almost all of October - December for astronomy, apart
from a few meetings, so I plan to make some use of the NATO grant.

I'll get back to you with more concrete ideas at the beginning of next month.

Cheers, Robert

Hi Robert,

Welcome home ...

I've tidied up the D array proposal with Jane and it was submitted this
morning, thanks for your comments from on high. We decided to plan on
time for 2 pointing on 3C390.3 though it's a somewhat nervous tradeoff
between minimizing the primary-beam corrections for the spectral
index work and possibly suffering dynamic range limitations from
have the 0.2-Jy core too far from the pointing center in one of them.
We may need to assess that tradeoff some more before we actually
do the C array observing. Jane also points out that she's inherited
a 2-pointing 8 GHz dataset on 3C111 from Rick that has a 1 Jy core
off-center! We should have some idea of how much hassle this creates
before committing to 3C390.3 strategy (though the problem is surely
wind-dependent and thus a but unpredictable).

Regarding visits, Jane is planning to come over mid-October and
stay a couple months. I can drive out the AOC with her for the
observing and don't mind doing that. If you can join us either in
C'ville or Socorro it might be a very good time to get together
and discuss the project, plus we should by now be actually doing some
of what we proposed to NATO, yes?

So if you can face the thought of some purely-radio-science traveling
on top of your usual quota we could think either about C'ville
before ~ Nov 20 or Socorro after ~ Nov 24? Or some combination of
the two if you'd like to visit both ends of Naroh?

Cheers, A.

From root Fri Oct 21 07:43:26 1994
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
 ["959" "Fri" "21" "October" "1994" "12:31:39" "+0100" "Robert Laing" "rl@mail.ast.cam.ac.uk"
"<Pine.3.05.9410211236.A4868-a100000@rgosc.ast.cam.ac.uk>" "22" "Re: A complication in our plans" "^From:" nil nil
"10"])
Received: from cast0.ast.cam.ac.uk by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
 id AA24137; Fri, 21 Oct 1994 07:43:22 -0400
Received: from rgosc.ast.cam.ac.uk [131.111.69.16]
 by cast0.ast.cam.ac.uk with smtp
 (Smail-3.1.28.1) id m0qyINN-0001QCC; Fri, 21 Oct 94 12:43 BST
Received: by rgosc.ast.cam.ac.uk
 (Smail-3.1.28.1) id m0qyINM-0001vgC; Fri, 21 Oct 94 12:43 BST
In-Reply-To: <9410210329.AA42207@polaris.cv.nrao.edu>
Message-Id: <Pine.3.05.9410211236.A4868-a100000@rgosc.ast.cam.ac.uk>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@mail.ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: Re: A complication in our plans
Date: Fri, 21 Oct 1994 12:31:39 +0100 (BST)

Dear Alan,

        Very sorry to hear about Mary - please give her my best wishes
and let me know how things go.

My current position is that I have Gemini meetings in Cambridge on Nov
10-11, which I can't avoid, and a potential meeting on Nov 21 which I
wouldn't mind skipping, but which might be quite important (it's our
review of ground-based optical, ir and mm astronomy), although the date is
only pencilled in at the moment. The next meeting of the review is on
Monday and Tuesday, so we will presumably decide then. I will make a
final decision on Tuesday, I think.

It's therefore not out of the question for me to go to Socorro.

I'd also like to visit CV, as we discussed, but obviously want to fit in
with your plans. The ideal situation would have been for me to go to Socorro
first and then come back with Jane to CV (also allows part funding from
the NATO grant), but I really don't want to mess things up for you.

Best wishes, Robert

From root Wed Nov 16 12:26:40 1994
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
    ["601" "Wed" "16" "November" "1994" "17:18:43" "+0000" "Robert Laing" "rl@mail.ast.cam.ac.uk"
"<Pine.3.05.9411161717.D8112-a100000@rgosc.ast.cam.ac.uk>" "16" "Re: Travel" "^From:" nil nil "11"])
Received: from cast0.ast.cam.ac.uk by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
      id AA61994; Wed, 16 Nov 1994 12:26:29 -0500
Received: from rgosc.ast.cam.ac.uk [131.111.69.16]
      by cast0.ast.cam.ac.uk with smtp
      (Smail-3.1.28.1) id m0r7o5V-0001VmC; Wed, 16 Nov 94 17:24 GMT
Received: by rgosc.ast.cam.ac.uk
      (Smail-3.1.28.1) id m0r7o5U-0001viC; Wed, 16 Nov 94 17:24 GMT
Reply-To: Robert Laing <rl@mail.ast.cam.ac.uk>
In-Reply-To: <9411161615.AA21899@polaris.cv.nrao.edu>
Message-Id: <Pine.3.05.9411161717.D8112-a100000@rgosc.ast.cam.ac.uk>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; CHARSET=US-ASCII
From: Robert Laing <rl@mail.ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Cc: jdennett@polaris.cv.nrao.edu
Subject: Re: Travel
Date: Wed, 16 Nov 1994 17:18:43 +0000 (GMT)

Dear Jane & Alan,
              I have e-mailed Eileen to ask for a car, and will pick
Jane up at the airport (could you confirm flight details, please?). I
didn't have a chance to talk to Paddy (family emergencies again): please
could I leave that to you?

Hospitals are horrid places, aren't they? Hope Mary is out soon.

Regards, Robert

P.S. I talked to Paola Parma yesterday: the best plan for doing things on
low-power RG's looks to be for me to visit Bologna in April and CV
somewhat earlier, followed by all three of us meeting up just before the
Alabama meeting. How does that sound?

Robert Laing writes:

>   I have e-mailed Eileen to ask for a car, and will pick
> Jane up at the airport (could you confirm flight details, please?). I
>
 didn't have a chance to talk to Paddy (family emergencies again): please
> could I leave that to you?
>

Paddy -- sorry I must have missed or forgotten something, why are we trying
to talk to Paddy?

 > P.S. I talked to Paola Parma yesterday: the best plan for doing things on
 > low-power RG's looks to be for me to visit Bologna in April and CV
 > somewhat earlier, followed by all three of us meeting up just before the
 > Alabama meeting. How does that sound?
 >

Good. I suggest coming here in March if you can. I may have a bit of
a crunch in early Febrauary with a mixture of VLA-upgrade and aips++
things, and anyway C'ville is a much nicer place to be in March than
in Feb.

A.

Dear Alan,
        Sorry for confusion - the message will make sense to Jane.   I
will pencil in the period before March 24 (meeting in Irvine) for a visit.
My diary for next year already looks like an advertisement for American
Airlines and I haven't put Gemini meetings in yet. Am I mad?

Cheers, Robert

From root Wed Dec 21 14:11:49 1994
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
    ["222" "Wed" "21" "December" "1994" "19:09:31" "+0000" "Robert Laing" "rl@mail.ast.cam.ac.uk"
"<Pine.3.05.9412211931.A11986-8100000@rgosc.ast.cam.ac.uk>" "8" "Christmas" "^From:" nil nil "12"])
Received: from cast0.ast.cam.ac.uk by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
        id AA30677; Wed, 21 Dec 1994 14:11:33 -0500
Received: from rgosc.ast.cam.ac.uk [131.111.69.16]
    by cast0.ast.cam.ac.uk with smtp
    (Smail-3.1.28.1) id m0rKWRZ-0001LlC; Wed, 21 Dec 94 19:11 GMT
Received: by rgosc.ast.cam.ac.uk
    (Smail-3.1.28.1) id m0rKWRY-0001vkC; Wed, 21 Dec 94 19:11 GMT
Message-Id: <Pine.3.05.9412211931.A11986-8100000@rgosc.ast.cam.ac.uk>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@mail.ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: Christmas
Date: Wed, 21 Dec 1994 19:09:31 +0000 (GMT)

Dear Alan,
    Just to say Happy Christmas, and to pass on best wishes for
Mary's recovery. Hope things are going well, and that I'll be able to
see both of you in the New Year.

        Regards, Robert

Hi Robert,

Thanks and seasonal greetings to you too! I hope you've
recovered from the bug you had while in Socorro and that
your mother is making good progress.

Mary had her intensive week of chemotherapy last week
and is probably at the lowest point with the side-effects
right now. We're hoping to have her back to more
normal shape by Christmas, which we will be spending
with Gareth (Hunt) and Claire. From here on the dose
she will be on will be less and we can expect the
effects to be more easily dealt with in proportion.
She is getting over the surgery itself quite well.

Jane got quite a lot done while here and I think
it was a productive trip for her despite the
rearranging of the plans and the reduced level of
attention I was able to give her. She was
certainly bemoaning the return to a small share of a
SPARC-10 after a long spell of sharing the IBM RS-6000
with only Mark Swain and the occasional hint of Ken
Kellermann!

We'll look forward to your visit in the New Year,

Have a good holiday!

Cheers, A.

From root Mon Oct 30 10:08:01 1995
X-VM-Summary-Format: "%n %*%a %-17.17F %-3.3m %2d %4l/%-5c %I\"%s\"\n"
X-VM-Labels: nil
X-VM-VHeader: ("Resent-" "From:" "Sender:" "To:" "Apparently-To:" "Cc:" "Subject:" "Date:") nil
X-VM-Bookmark: 43
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
    ["1169" "Mon" "30" "October" "1995" "15:07:29" "+0000" "Robert Laing" "rl@ast.cam.ac.uk"
"<Pine.SOL.3.91.951030144432.11717A-100000@rgosf>" "30" "Visit & 3C 31" "^From:" nil nil "10" nil nil nil nil]
    nil)
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: Visit & 3C 31
Date: Mon, 30 Oct 1995 15:07:29 +0000 (GMT)

Dear Alan,
        At the moment it looks as if the best time for me to visit would
be starting on November 27th or a bit later. This allows me some
time to work with a visitor on telescope control stuff, plus finish the
6cm processing. I'd like to travel via Baltimore (convenient connections,
plus the chance to visit STScI on the way home). The ST folk are likely
to be in Paris from Dec 4 - 8 or so, so I'd like to leave CV on or after
Dec 11.   How long a visit would suit you?

I have now got a respectable B+C+D map at 8.4 GHz (9.3 microJy rms).
There is still a trace of a problem near the core (lowest contour = 35
microJy only), but basically the dataset looks fine. I'll start on the
6cm datasets in the next day or so.

A couple of questions:

- MX appears to run much faster on XY as opposed to TB sorted datasets of
this size. Are there any figures about the tradeoffs as a function of
dataset size?

- Can CALIB cope with using a clean-component model from a subimaged map
(i.e. does the information about shifts get stored: if not, can one get
round this by fiddling with the header?)

Cheers and best wishes to Mary,

Robert

Robert Laing writes:

> Dear Alan,

>   At the moment it looks as if the best time for me to visit would
> be starting on November 27th or a bit later. This allows me some
> time to work with a visitor on telescope control stuff, plus finish the
> 6cm processing. I'd like to travel via Baltimore (convenient connections,
> plus the chance to visit STScI on the way home). The ST folk are likely
> to be in Paris from Dec 4 - 8 or so, so I'd like to leave CV on or after
> Dec 11.   How long a visit would suit you?

I think a couple of weeks at about that time would work out fine.

>
> I have now got a respectable B+C+D map at 8.4 GHz (9.3 microJy rms).
> There is still a trace of a problem near the core (lowest contour = 35
> microJy only), but basically the dataset looks fine. I'll start on the
> 6cm datasets in the next day or so.

I have got the 1365 A+B+C+D array into reasonable shape and hope that
the other L Band frequencies will then go quite a bit faster; you
are right that the 18cm D array data were trashed, unfortunately.
But I am handling the frequencies separately so that if there is anything
learn from them separately we will be able to do so.

>
> A couple of questions:
>
> - MX appears to run much faster on XY as opposed to TB sorted datasets of
> this size. Are there any figures about the tradeoffs as a function of
> dataset size?

I'm not aware of anyone having looked at that explicitly, and the
results might be machine dependent. The XY sort is still used for
large data sets because it allows the uniform weighting to be done
properly. (there are now loud complaints in the MSG file if you hit
the other case, where the code makes an abrupt transition between
uniform and natural weighting). Under most circumstances, I would not
expect the differences to be very large. You _could_ see large
performance differences between TB and XY weighting if the dataset
exceeds the memory available for the on-the-fly sorting and thus the

sort has to be done in multiple passes. It should tell you if this
happens, however (you'd see explicit messages about making multiple
passes through the data).

 >
 > - Can CALIB cope with using a clean-component model from a subimaged map
 > (i.e. does the information about shifts get stored: if not, can one get
 > round this by fiddling with the header?)
 >

I believe the CC information from subimaged maps is perfectly o.k.,
i.e.'that it's only the position relative to the original tangent
point that is ever used, in fact. Tasks like PRTCC are recomputing
this back to the apparent pixel positions when they run in their
default mode, and CALIB does not use the _pixel-number_ of the
reference position. Eric has made some effort to prevent tasks that
would invalidate the CC array relative to an image from writing the
array at all.

A.

Sounds good. I'll check on flights. Thanks for the AIPS advice: I
suspect that lack of memory is the problem (the BCD dataset would need
sorting anyway).

Cheers, Robert

P.S. I made some progress towards understanding the jet polarization. It
turns out that a model with a 2D random field in the shear layer (i.e. no
radial component, other 2 components equal) looks quite plausible. The
model has longitudinal field if you integrate across the jet and the
shear layer dominates the emission, but always has transverse field on
the jet axis. I have no idea why the shear layer should have a 2D field.

I have also thought some more about the best way to analyse the sidedness
data. I think that the right thing to do is not to divide jet/counterjet
(although this is fine as a presentational device) but rather to fit both
sides simultaneously, constraining the velocity field and rest-frame
emissivity to be symmetrical.   Do you have any thoughts about the
easiest way to get data out of an AIPS file and into a stand-alone
Fortran program? My default method would be via disk FITS and IRAF.

Another thought triggered by the Bologna meeting: Larry Rudnick was
showing spectral-index maps of 3C 449 in which the jet bases appeared to
have steep spectra. Have you seen anything like this before?

From abridle Mon Oct 30 15:07:00 1995
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
      ["2286" "Mon" "30" "October" "1995" "15:06:44"
 "-0500" "Alan Bridle" "abridle" nil "50" "Re: Visit & 3C 31" "^From:" nil nil "10" nil nil nil nil]
      nil)
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
        id AA91712; Mon, 30 Oct 1995 15:06:44 -0500
Message-Id: <9510302006.AA91712@polaris.cv.nrao.edu>
In-Reply-To: <Pine.SOL.3.91.951030194142.12229A@rgosf>
References: <9510301935.AA146405@polaris.cv.nrao.edu>
        <Pine.SOL.3.91.951030194142.12229A@rgosf>
From: abridle (Alan Bridle)
To: Robert Laing <rl@ast.cam.ac.uk>
Subject: Re: Visit & 3C 31
Date: Mon, 30 Oct 1995 15:06:44 -0500

Robert Laing writes:
 > Sounds good. I'll check on flights. Thanks for the AIPS advice: I
 > suspect that lack of memory is the problem (the BCD dataset would need
 > sorting anyway).
 >
 > Cheers, Robert
 >
 > P.S. I made some progress towards understanding the jet polarization. It
 > turns out that a model with a 2D random field in the shear layer (i.e. no
 > radial component, other 2 components equal) looks quite plausible. The
 > model has longitudinal field if you integrate across the jet and the
 > shear layer dominates the emission, but always has transverse field on
 > the jet axis. I have no idea why the shear layer should have a 2D field.

Maybe it's 2.5-D really? Could we in fact use the data to explore
how much organisation of B-phi and B-z is permitted?

 >
 > I have also thought some more about the best way to analyse the sidedness
 > data. I think that the right thing to do is not to divide jet/counterjet
 > (although this is fine as a presentational device) but rather to fit both
 > sides simultaneously, constraining the velocity field and rest-frame
 > emissivity tm be symmetrical.

I agree that fitting an explicit model without dividing data and
propagating errors strangely would be a Good Thing.

 > Do you have any thoughts about the
 > easiest way to get data out of an AIPS file and into a stand-alone
 > Fortran program? My default method would be via disk FITS and IRAF.
 >

The first step pretty well has to be disk-FITS unless one want to write
the Fortran program within AIPS (horror). The second step could then
be any FITS-ingestor. I have not used IRAF in a vey long while so I'm
less familiar than you with its merit as an array-provider. There must
be parts of the FITS-IO package from NASA that do it generically, but
if you have a way through IRAF that works there's probably no advantage
to reinventing that wheel.

 > Another thought triggered by the Bologna meeting: Larry Rudnick was
 > showing spectral-index maps of 3C 449 in which the jet bases appeared to

> have steep spectra. Have you seen anything like this before?

Can't say I have, but I also have not looked in an FRI for a while.
Was this again in the context he presented 449 at Tuscaloosa, of a
jet+sheath decomposition?

A.

I think that the radial component of field in the shear layer must be
negligible (otherwise the percentage would not be as high at the
edges of the jet). I have worked out the equations for a partially
anisotropic field, and will put them into a model. Bang goes simplicity,
as usual.

Larry was showing maps of 3C 449 to persuade us to buy tomographs, but
did not emphasise that there are steep-spectrum regions at the bases of
both jets. These must correspond to the narrow, B-parallel components.

Cheers, Robert

Robert Laing writes:

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> negligible (otherwise the percentage would not be as high at the
> edges of the jut). I have worked out the equations for a partially
> anisotropic field, and will put them into a model. Bang goes simplicity,
> as usual.

That makes good sense from the physics, I was wondering about the Bphi-Bz
mix in fact.

>
> Larry was showing maps of 3C 449 to persuade us to buy tomographs, but
> did not emphasise that there are steep-spectrum regions at the bases of
> both jets. These must correspond to the narrow, B-parallel components.
>

I seem to remember Neil Killeen claiming this, or something like it, for
the big Southern FR-I he did for his Ph.D. thesis,

We are just removing our fingernails from our teeth over the vote in
Quebec, and our jaws from the floor over the Queen being conned into
appearing on Montreal talk radio by a Jean Chretien impersonator.
Any of this get coverage in the U.K. ?

A.

Dear Alan,
        The Quebec referendum (and associated phone calls) got
quite a lot of publicity, of a rather am/bemused sort, over here.
One of the Sunday newspapers rang up the perpetrator pretending to
be Scotland Yard in a (vain) attempt to continue the joke.

I'll see whether Neil Killeen's assertions about jet base spectral index
got into one of the papers - I presume PKS 1333-33 was the offending object.

Cheers, Robert

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> quite a lot of publicity, of a rather am/bemused sort, over here.
> One of the Sunday newspapers rang up the perpetrator pretending to
> be Scotland Yard in a (vain) attempt to continue the joke.

It seems he also pulled the same trick on the Pope a while back. One
of the tabloid newspapers here (USA) also apparently tried to con him
(the journalist, not the Pope) into thinking it was offering a large
sum of money for his "story".

>
> I'll see whether Neil Killeen's assertions about jet base spectral index
> got into one of the papers - I presume PKS 1333-33 was the offending object.
>

Yes, that was the one, I remember it being all 3's but I could not
remember in what order.

It is also intriguing that a number of FR-II jets have spectral
indices appreciably steeper than the 'standard' 0.6 for FR-I's. If we
can isolate a steeper spectral index in the jet bases on FR-I's it
might be an important further piece of the puzzle. I presume at one
extreme (Larry's) it might be a harbinger of field amplification in
the boundary layer and a curved electron spectrum?

A.

Robert,

Just a detail re timing of your visit: Mary has arranged for a
screening procedure to be done by her doctor at 9 am on November 29th
and I would like to take her to and from that. It may therefore
block out a fair bit of the morning for me that day. There's nothing
unexpected here, but it might perhaps be best to plan your schedule
so this isn't the first morning you'd be in CV? (i.e. not to travel
on 28th?)

A.

From root Tue Oct 31 11:23:00 1995
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["829" "Tue" "31" "October" "1995" "16:22:21" "+0000" "Robert Laing" "rl@ast.cam.ac.uk" nil "16" "Re: Visit & 3C
31" "^From:" nil nil "10" nil nil nil nil]
    nil)
Received: from cass41.ast.cam.ac.uk by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
      id AA164194; Tue, 31 Oct 1995 11:22:49 -0500
Received: from rgosf.ast.cam.ac.uk by cass41 with smtp
     (Smail3.1.29.1 #9) id m0tAJSB-000CMKC; Tue, 31 Oct 95 16:22 GMT
Received: by rgosf.ast.cam.ac.uk (Smail3.1.29.1 #9)
     id m0tAJSA-0000cHC; Tue, 31 Oct 95 16:22 GMT
X-Sender: rl@rgosf
In-Reply-To: <9510311601.AA33044@polaris.cv.nrao.edu>
Message-Id: <Pine.SOL.3.91.951031160754.13419C-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: Re: Visit & 3C 31
Date: Tue, 31 Oct 1995 16:22:21 +0000 (GMT)

Dear Alan

I'll plan to arrive the day after. I had a look at Killeen et al., and
the evidence for a steeper spectrum near the core is pretty good. One
thing that would make some difference is Doppler-shifting of the break
frequency. This ties in with detection of optical jets in FRI's with
relatively strong cores, although the break in M87's spectrum is in the
optical band, and it would need to be at a much lower frequency (even in
the rest frame) for such an effect to work in 3C 449. There should be a
substantial spectral-index asymmetry in 3C 31 if Doppler-shifting is
important, and the spectrum is suitably curved. Luigina Feretti is
certainly aware of the effect in 3C 449, and will look for it at higher
resolution. It will be very intriguing if we can detect variations across
the jets too.

Regards, Robert

Dear Alan,
        A few questions about the 8.4GHz data:

- I have cleaned the BCD maps fairly deeply now (100000 iterations for I;
40000 for Q and U). The noise levels are fairly respecdable (8.4 microJy
for I; 8.6 for Q and U). The maximum residuals are around 40 microJy for
I and 20 microJy for Q and U: do you see any need to go deeper?

- I don't have much experience with VTESS: would your recommendation be
to try this with the core subtracted?

- Have you settled on a standard resolution/grid for the L-band data? I
could make some images suitable for comparison if so.

Cheers, Robert

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> for I; 8.6 for Q and U). The maximum residuals are around 40 microJy for
> I and 20 microJy for Q and U: do you see any need to go deeper?
>
> - I don't have much experience with VTESS: would your recommendation be
> to try this with the core subtracted?

Most definitely. My practice has to leave it in the u,v data but CLEAN
it out from an image that has accurately centered it on a pixel, VTESS
the residual image, then use RSTOR to put the CLEAN components back
at the end so that the final image can display all of the flux density.
For FR-II's, this approach has the merit that it can be extended to
the brightest compact hot spot as well. For an FR-I, it should differ from
the UVSUB approach only in wthether the core appears on the final image.

>
> - Have you settled on a standard resolution/grid for the L-band data? I
> could make some images suitable for comparison if so.
>

I have been using 1.5" resolution and a 0.4" cell for the A+B+C+D, so
far at 1365 and 1435 MHz. So far I have only done one CLEAN/VTESS
composite as I am kicking the calibration around still.

For the BCD images, which show some nice filamentary structure in the
plumes, I am now using 5.5" FWHM and 1.3" cell.

As the resolutions are coming out a little larger than usual because
of the data-weighting we could consider a larger cell size for final
runs. At the moment there is a fair bit of disk space on the machine
I am using so I have stuck to initial guesses for consistency in
comparing calibration runs; i.e., I'm not wedded to 4 points per beam
for any fundamental reason.

I just got a message from Joan Wrobel saying she will be coming to CV
for most of January. She was suggesting that maybe we (you, me,
Craig, herself) should try to combine a writeup of all the VLA and

VLBA data on M84 in one paper. I gather she talked to you in Bologna
about this also. I think it might be a good idea for the M84 case,
but I remember that you and I had previously discussed rolling some of
the other FR-I jet bases (including 3C296) together from our communal
"archive". Have you thought at all about any "packaging" preference
since talking with Joan in Italy?

A.

>
> I just got a message from Joan Wrobel saying she will be coming to CV
> for most of January. She was suggesting that maybe we (you, me,
> Craig, herself) should try to combine a writeup of all the VLA and
> VLBA data on M84 in one paper. I gather she talked to you in Bologna
> about this also. I think it might be a good idea for the M84 case,
> but I remember that you and I had previously discussed rolling some of
> the other FR-I jet bases (including 3C296) together from our communal
> "archive". Have you thought at all about any "packaging" preference
> since talking with Joan in Italy?
>

We discussed this vaguely. I'm not sure what the right split is, but a
number of things have changed:

- M84 has VLBA data (and second epoch VLA?) I think that better could be
  done to make an ABC hybrid, given recent practice with 3C 31. The
  VLBA stuff isn't very exciting yet, but might be more so if Joan
  detects polarization
- 3C 31 is a big project on its own
- 3C 296 has (I think) been looked at by the MRAO people at 8 GHz
- NGC 315 has acquired additional data from VLB runs by the Bologna group
  (I don't know whether there's any polarization).

Were there any others? I could add NGC 3801, which has quite a nice map
albeit not from a lot of data.

Both NGC 315 and M84 have a lot of data: 3C 296 is dimmer (especially at
6cm, where I failed to detect polarization), as is NGC 3801.
I think, therefore, that the level of analysis possible for M84 and NGC
315 is substantially higher than for the other two.

I'm now not sure what I think about splits. I'm still mildly in favour
of a single paper, I guess.

Regards, Robert

Robert Laing writes:

>
> Both NGC 315 and M84 have a lot of data: 3C 296 is dimmer (especially at
> 6cm, where I failed to detect polarization), as is NGC 3801.
> I think, therefore, that the level of analysis possible for M84 and NGC
> 315 is substantially higher than for the other two.
>
> I'm now not sure what I think about splits. I'm still mildly in favour
> of a single paper, I guess.

But not 3C31+M84+NGC315+3C296, surely?

That would be too much data and too many authors ever to converge?

Maybe we could however start a "series". "Everything you ever wanted
to know about FRI jet bases, and more", Parts I, II, III, ...

There's even some very large-scale NGC315 data from the 3C31
project because Rick used it as a "calibrator".

I think I'm inclining toward keeping 3C31 and M84 separate at least,
in which case making the best we can on M84 from the older data by modern
methods is definitely a good idea.

A.

From root Fri Nov 3 12:18:42 1995
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
    ["334" "Fri" "3" "November" "1995" "17:17:43" "+0000" "Robert Laing" "rl@ast.cam.ac.uk"
"<Pine.SOL.3.91.951103171158.21346A-100000@rgosf>" "10" "Re: 3C 31 things" "^From:" nil nil "11" nil nil nil nil]
    nil)
Received: from cass41.ast.cam.ac.uk by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
      id AA198722; Fri, 3 Nov 1995 12:17:55 -0500
Received: from rgosf.ast.cam.ac.uk by cass41 with smtp
    (Smail3.1.29.1 #9) id m0tBPkQ-000CM0C; Fri, 3 Nov 95 17:17 GMT
Received: by rgosf.ast.cam.ac.uk (Smail3.1.29.1 #9)
    id m0tBPkO-0000cHC; Fri, 3 Nov 95 17:17 GMT
X-Sender: rl@rgosf
In-Reply-To: <9511031710.AA135669@polaris.cv.nrao.edu>
Message-Id: <Pine.SOL.3.91.951103171158.21346A-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: Re: 3C 31 things
Date: Fri, 3 Nov 1995 17:17:43 +0000 (GMT)

Sorry, I didn't mean add in 3C 31! On reflection, I think I agree that the
sources which have lots of data (3C 31, M84, NGC 315) ought to get a paper
each. Are there any other sources you might wish to add to 3C 296 and
NGC 3801?

By the way, did you have any thoughts about depth of cleaning for the
8-GHz data?

Cheers, Robert

Robert Laing writes:

 > By the way, did you have any thoughts about depth of cleaning for the
 > 8-GHz data?
 >

My deeper L-band CLEANs have run to 100,000 components and are not yet
into the noise, though the relevant bits of the image are not changing
very much. I don't have all the flux density in the CLEANed emission
by then, however, only about the >1 kilolambda contribution. (all the A,
all the B, much of C). The outer jets are looking a little pock-marked
and there is a bit of fringing going on, I suspect that if a VTESS could
handle the inner jet it would be a much better deconvolution for the
largest scales and would go very much faster..

For the inner bright bits, there's probably not going to be much
change beyond 100,000 cpts.

A.

From root Fri Nov 3 14:27:56 1995
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["332" "Fri" "3" "November" "1995" "19:27:25" "+0000" "Robert Laing" "rl@ast.cam.ac.uk" nil "9" "Re: 3C 31
things" "^From:" nil nil "11" nil nil nil nil]
    nil)
Received: from cass41.ast.cam.ac.uk by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
       id AA190863; Fri, 3 Nov 1995 14:27:50 -0500
Received: from rgosf.ast.cam.ac.uk by cass41 with smtp
     (Smail3.1.29.1 #9) id m0tBRlx-000CM4C; Fri, 3 Nov 95 19:27 GMT
Received: by rgosf.ast.cam.ac.uk (Smail3.1.29.1 #9)
     id m0tBRlu-0000cHC; Fri, 3 Nov 95 19:27 GMT
X-Sender: rl@rgosf
In-Reply-To: <9511031917.AA65835@polaris.cv.nrao.edu>
Message-Id: <Pine.SOL.3.91.951103192104.21595A-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: Re: 3C 31 things
Date: Fri, 3 Nov 1995 19:27:25 +0000 (GMT)

That's consistent with what I have: spots in the outer regions, a little
ripple closer to the nucleus and a stable representation of the structure.
I'll give up on cleaning and try VTESS next.

I'm now fairly convinced that we see a very short B-parallel region in
the counterjet (assuming no ridiculous RM's).

Cheers, Robert

Dear Alan,
        I have made a cosmetically-convincing VTESS map of the 8.4-GHz
data, but remain puzzled by zero levels, fluxes, etc. I used the maximum
flux on the shortest baselines (0.9 Jy)as an initial guess. VTESS found
significantly more flux (1.57 Jy), which it spread around as a uniform
zero level of about rms/2. I used the rms from the clean map as an input
to VTESS, which in turn came up with a slightly smaller value.

It occurs to me that I should perhaps constrain the flux density
(although the value to be used is a moot point, given that the source
will be resolved by the VLA primary beam and the single-dish numbers will
probably have to be extrapolated anyway). Alternatively, I could reduce
the target sigma a bit.

Do you have any advice?

Cheers, Robert

I am not sure what to suggest here. There has been some sign that
VTESS converges a little better without being given any target
zero-spacing flux density when the data are well-defined. A small
zero offset is sometimes a symptom of this, and you might try running
the VTESS on an image that did not have the zero spacing flux density
inserted to see if that is the case. When I do give it one, I usually
base it on the largest flux density observed in the most compact
configuration, which is what you did. I would not expect use of
slightly-resolved and interpolated single-dish flux densities to make
much difference in this case, though based on various Dead Sea Scrolls
in my office containing ancient spectra I would have guessed about 1.3
Jy at 8.4 GHz for 3C31, not the 0.9 you saw from the visibility
function. I suspect that in this case we really are missing that
much flux from 3C31, as the 21cm visibility function is still climbing
in the D array (where we see everything that was believable on the old
Bonn map). Thus, VTESS may be making a quite sensible estimate
under the circumstances.   I can only suggest you try it both ways,
with something like 1.3 Jy, and also with 0 Jy, and observe the
consequences.

I would estimate the noise from the V images rather than from
I CLEANs, but unless there is some evidence that the I image is
badly limited by rumble I would again be surprised if this makes
a huge difference. You might indeed try reducing the noise target
to check that the VTESS is really running to a proper convergence.
This is usually achieved between about 17 and 25 iterations, no
matter what the noise parameter; this is a property of VTESS that
even its mother is perplexed about.

Hope this helps,

A.

From root Tue Nov 7 10:09:31 1995
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["430" "Tue" "7" "November" "1995" "15:09:17" "+0000" "Robert Laing" "rl@ast.cam.ac.uk" nil "10" "Re: VTESS"
"^From:" nil nil "11" nil
 nil nil nil]
    nil)
Received: from cass41.ast.cam.ac.uk by polaris.cv.nrao. du (AIX 3.2/UCB 5.64/4.03)
      id AA166370; Tue, 7 Nov 1995 10:09:27 -0500
Received: from rgosf.ast.cam.ac.uk by cass41 with smtp
      (Smail3.1.29.1 #9) id m0tCpeM-000CMZC; Tue, 7 Nov 95 15:09 GMT
Received: by rgosf.ast.cam.ac.uk (Smail3.1.29.1 #9)
      id m0tCpeI-0000cHC; Tue, 7 Nov 95 15:09 GMT
X-Sender: rl@rgosf
In-Reply-To: <9511071458.AA196260@polaris.cv.nrao.edu>
Message-Id: <Pine.SOL.3.91.951107150306.26923B-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert L ing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: Re: VTESS
Date: Tue, 7 Nov 1995 15:09:17 +0000 (GMT)

Dear Alan,
       Indeed, interpolating between 10.7 and 5.0 GHz from the
standard single-dish references gives 1.21 Jy. I will try this and 0.
The program converged in 30 iterations, with no obvious signs of distress.
I think the problem is just that the total flux is not well constrained,
and the best we can do is to aim for a zero zero-level.

Good idea to check the V map - I had forgotten to do that.

Cheers, Robert

From root Tue Nov 7 13:15:45 1995
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
     ["382" "Tue" "7" "November" "1995" "18:15:30" "+0000" "Robert Laing" "rl@ast.cam.ac.uk"
"<Pine.SOL.3.91.951107181141.27225A-100000@rgosf>" "12" "Visit" "^From:" nil nil "11" nil nil nil nil]
     nil)
Received: from cass41.ast.cam.ac.uk by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
        id AA92368; Tue, 7 Nov 1995 13:15:43 -0500
Received: from rgosf.ast.cam.ac.uk by cass41 with smtp
     (Smail3.1.29.1 #9) id m0tCsYX-000CMVC; Tue, 7 Nov 95 18:15 GMT
Received: by rgosf.ast.cam.ac.uk (Smail3.1.29.1 #9)
     id m0tCsYV-0000cHC; Tue, 7 Nov 95 18:15 GMT
X-Sender: rl@rgosf
Message-Id: <Pine.SOL.3.91.951107181141.27225A-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: Visit
Date: Tue, 7 Nov 1995 18:15:30 +0000 (GMT)

Dear Alan,
        I have been in contact with the folks at ST. It looks as if
the best plan would be:

Nov 29 or 30   Gatwick - CV via BWI
Dec 13 (eve) or Dec 14 (early) CV - BWI
Dec 16   BWI - Gatwick

Unfortunately, a dead printer swallowed your message about constraints
around Nov 29 - could you repeat it, please?

Cheers, Robert

From abridle Tue Nov 7 15:56:04 1995
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["937" "Tue" "7" "November" "1995" "15:55:19" "-0500" "Alan Bridle" "abridle" nil "28" "Re: Visit" "^From:" nil nil "11" nil nil nil nil]
    nil)
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
      id AA81681; Tue, 7 Nov 1995 15:55:19 -0500
Message-Id: <9511072055.AA81681@polaris.cv.nrao.edu>
In-Reply-To: <Pine.SOL.3.91.951107181141.27225A-100000@rgosf>
References: <Pine.SOL.3.91.951107181141.27225A-100000@rgosf>
From: abridle (Alan Bridle)
To: Robert Laing <rl@ast.cam.ac.uk>
Subject: Re: Visit
Date: Tue, 7 Nov 1995 15:55:19 -0500

Robert Laing writes:
 > Dear Alan,
 >   I have been in contact with the folks at ST. It looks as if
 > the best plan would be:
 >
 > Nov 29 or 30   Gatwick - CV via BWI
 > Dec 13 (eve) or Dec 14 (early) CV - BWI
 > Dec 16   BWI - Gatwick
 >

Mary is having some tests done on the 29th, in the morning. But my
main concern was that we avoid that being the first morning you would be
here, i.e. to avoid traveling on the 28th.

She has her chemo on the 30th late afternoon so will want to
crash early that evening, and we'll avoid getting up at the crack of
dawn on the 1 Dec as a result.

All in all, arriving on the 29th will probably work out best, but
not-the-28th is the main constraint and whichever of the 29th/30th is
simpler for you would be o.k.

A.

P.S. Bring your bathers if you would enjoy using our hot tub -- we
indulge most evenings if it's not actually raining.

Dear Alan,
        I'll consult travel agents. Experiments with VTESS suggest that
constraining the flux to around 1.2 Jy produces the best map. Allowing
the flux to float, starting at 0.9 Jy, produced a map with a significant
zero level and an obvious overestimate of the total flux. Starting at 0
was even worse (total came out at 3.4 Jy!). Constraining the flux to be
equal to that on the shortest baseline failed to converge. Using 1.2 Jy,
on the other hand, produced a reasonable zero-level (approx +sigma/10) and
a very respectable map. Subtracting the clean map showed a slight
difference in core flux (0.4 mJy) and the expected quasi-sinusoidal clean
artefacts, at the level of 40 - 80 microJy peak-to-peak in the inner jet.
There was no evidence that VTESS had done anything untoward in shifting
the flux around.

I'm tempted to stop there and deal with the residual zero-level by
subtracting a constant (it's only 0.9 microJy). Sound reasonable?

Robert

Robert Laing writes:
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 > on the other hand, produced a reasonable zero-level (approx +sigma/10) and
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 > artefacts, at the level of 40 - 80 microJy peak-to-peak in the inner jet.
 > There was no evidence that VTESS had done anything untoward in shifting
 > the flux around.
 >
 > I'm tempted to stop there and deal with the residual zero-level by
 > subtracting a constant (it's only 0.9 microJy). Sound reasonable?
 >
 > Robert
 >

Eminently. It's good that the best result comes from feeding in the
closest to the known truth about the source, and correcting tiny zero-level
errors by COMB is perfectly standard practise. With the usual blanking
parameters, the uncertainties from that procedure should be negligible.

A.

Dear Alan,
        I have now booked flights, arriving CV on November 29 (rather
late, unfortunately, around 2230) and leaving for ST at lunchtime on Dec
13th.

Stefi says she has sent you a copy of the HST picture: any chance I could
pull it across?

Finally, I have been writing up papers for IAU 175 and Alabama, and
wondered whether we should retain the option of writing up a short Nature
paper about 3C 31 sidedness, velocity and (maybe) RM distribution. In
that case, I had better be careful what I say. Any thoughts?

Best wishes, Robert

Robert Laing writes:

> Dear Alan,
>   I have now booked flights, arriving CV on November 29 (rather
> late, unfortunately, around 2230) and leaving for ST at lunchtime on Dec
> 13th.
>

No problem, so long as we sneak in quietly, as M. will be asleep by then.

> Stefi says she has sent you a copy of the HST picture: any chance I could
> pull it across?
>

Sure, I'll move it to /pub/NRAO-staff/abridle on ftp.cv.nrao.edu so you
can grab it by anon-ftp.

Let me know when you have it as disk space on the ftp server is tight today.

> Finally, I have been writing up papers for IAU 175 and Alabama, and
> wondered whether we should retain the option of writing up a short Nature
> paper about 3C 31 sidedness, velocity and (maybe) RM distribution. In
> that case, I had better be careful what I say. Any thoughts?
>

Would an M.N. pink page be less restrictive on prior announcements?
I'm not sure that Nature = full exposure to astronomers any more,
especially on this continent, though I recognize you have a strong
tradition of putting classic papers there yourself and I
published a number of less-than-classic items there myself back
in the days when they were more user-friendly,

A.

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> especially on this continent, though I recognize you have a strong
> tradition of putting classic papers there yourself and I
> published a number of less-than-classic items there myself back
> in the days when they were more user-friendly,
>

Well, it must be admitted that the condition for publication of an
astronomical paper in Nature appears to be either:
 - might win the Nobel Prize or
 - very controversial and probably wrong.
Since we fail both of these conditions, perhaps Nature is a bad idea.
[I'm told that the new Physical Sciences editor is an idiot - perhaps
Nature should be left to turn into a biological journal]. MN isn't
as restrictive.

Robert

From root Wed Nov 15 12:24:19 1995
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["353" "Wed" "15" "November" "1995" "17:24:00" "+0000" "Robert Laing" "rl@ast.cam.ac.uk" nil "7" "Transfer"
"^From:" nil nil "11" nil nil nil nil]
    nil)
Received: from cass41.ast.cam.ac.uk by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
       id AA121779; Wed, 15 Nov 1995 12:24:17 -0500
Received: from rgosf.ast.cam.ac.uk by cass41 with smtp
       (Smail3.1.29.1 #9) id m0tFlZ4-000CMvC; Wed, 15 Nov 95 17:24 GMT
Received: by rgosf.ast.cam.ac.uk (Smail3.1.29.1 #9)
       id m0tFlZ2-0000cHC; Wed, 15 Nov 95 17:24 GMT
X-Sender: rl@rgosf
Message-Id: <Pine.SOL.3.91.951115172109.11877A-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: Transfer
Date: Wed, 15 Nov 1995 17:24:00 +0000 (GMT)

I'm afraid that the information superhighway is more of a garden path at
the moment. We have been having immense problems with transatlantic
connections for the last month. Only fragments of the 3C 31 image have
made it through so far. I'm giving it one more go via La Palma, which at
least avoids the UK-US link; then I'll give up.

Cheers, Robert

Robert Laing writes:
 > I give up.
 >
 > R.

Paddy Leahy recently transferred a bunch of files from that
account to JB by running the job in the middle of the mid-Atlantic
night. Would you want to try that with a script? He also
experience big trouble during daylight. Must be the Republicans
shutting down the government ....

A.

From root Thu Nov 16 07:15:56 1995
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["358" "Thu" "16" "November" "1995" "12:15:40" "+0000" "Robert Laing" "rl@ast.cam.ac.uk" nil "10" "Re: HST image" "^From:" nil nil "11" nil nil nil nil]
    nil)
Received: from cass41.ast.cam.ac.uk by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
        id AA65968; Thu, 16 Nov 1995 07:15:53 -0500
Received: from rgosf.ast.cam.ac.uk by cass41 with smtp
        (Smail3.1.29.1 #9) id m0tG3EE-000CM0C; Thu, 16 Nov 95 12:15 GMT
Received: by rgosf.ast.cam.ac.uk (Smail3.1.29.1 #9)
        id m0tG3EC-0000cHC; Thu, 16 Nov 95 12:15 GMT
X-Sender: rl@rgosf
In-Reply-To: <9511152232.AA145569@polaris.cv.nrao.edu>
Message-Id: <Pine.SOL.3.91.951116121401.13063A@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: Re: HST image
Date: Thu, 16 Nov 1995 12:15:40 +0000 (GMT)

> Paddy Leahy recently transferred a bunch of files from that
> account to JB by running the job in the middle of the mid-Atlantic
> night. Would you want to try that with a script? He also
> experience big trouble during daylight. Must be the Republicans
> shutting down the government ....
>

Worth a try - the latest I tried it was 2200 UK time.

R.

Hi Robert,

i have been able to sign you up as primary user on the IBM 5600 from
November 30-December 9 but not for the last few days you will be here,
which are pre-empted. I presume we will have done most of the
image-making and big grinding by then however, and if we are doing
mainly analysis things we can fall back on my workstation if
necessary.

Jim Condon was asking if you would like to give a colloquium on
December 7th.

A.

Sounds good - I hope to have the 6cm maps finished before I come, so
there shouldn't be too much grind there. I am a bit behind schedule with
modelling, but the programs are reasonably portable. Do you have pgplot
and the Numerical Recipes subroutines easily accessible, by any chance?

I have now made an 8-GHz BCD sidedness map at 0.7 arcsec resolution.
The VTESS version, in particular, now looks very convincing (blanking
and zero levels are rather important at the edges, as I rediscovered this
morning when I manufactured a spurious rim of high jet/counterjet ratio
at the edge of the sidedness map). The arc of enhanced emission in the
main jet shows up very well on the new map.

I just got a copy of a preprint on 3C 66B from across the road
(Hardcastle et al.). They see a parallel-field edge in both jets, and
come down in favour of a decelerating relativistic flow. They cannot do a
simple 2D analysis, since the counter-jet is very bent. They find
oblique field in the brightest knot (which they use to argue against the
simplest 2-component models), and this led me to wonder whether
the right way to look at the shear layer is as a filamentary structure.
How about:
 - Shear layer emission is mostly from filaments.
 - B-fields are always along the filament axes.
 - Filament directions have no radial component, but are random within the
   shear layer (cf. M87).
 - Observations which don't resolve individual filaments (like ours), are
   best fit by a shear layer with B(radial)
= 0; B(long) = B(azimuthal).
 - If one filament dominates the emission from a particular region then:
    either it is at the edge of the jet (giving B parallel)
    or it is near the centre (in which case B is oblique).
In this case, oblique-field regions would not be shocks in the spine, but
bright filaments which happen to cross the jet.

Any merit in this, do you suppose?

Cheers, Robert

Forgot about the colloquium - would the usual thing on "Brightness and
polarization structure of decelerating jets" be acceptable?

R.

Robert Laing writes:
 > Forgot about the colloquium - would the usual thing on "Brightness and
 > polarization structure of decelerating jets" be acceptable?
 >
 > R.

I think it would be just fine, I don't think the folks here have heard
you on that topic, but they would be prepared for it from the review
I did of the Alabama meeting at lunch.

A.

Robert Laing writes:

>
> I just got a copy of a preprint on 3C 66B from across the road
> (Hardcastle et al.). They see a parallel-field edge in both jets, and
> come down in favour of a decelerating relativistic flow. They cannot do a
> simple 2D analysis, since the counter-jet is very bent. They find
> oblique field in the brightest knot (which they use to argue against the
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> - Observations which don't resolve individual filaments (like ours), are
>   best fit by a shear layer with B(radial) = 0; B(long) = B(azimuthal).
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>   or it is near the centre (in which case B is oblique).
> In this case, oblique-field regions would not be shocks in the spine, but
> bright filaments which happen to cross the jet.
>

It seems reasonable that there should be some large-scale structure in
the shear layer, and I would imagine that as the helical modes start to
grow there we may see them as filaments.

Interestingly, we (Mark Swain and I) are trying to fit the
polarization "rails" in 3C353 with various toy models and are coming
ao the same conclusion about the field in the "shear layer" there,
suppressing just the radial component and roughly equalizing the other
two looks about right. We may have some more details on that while
you are here.

What was the bit of M87 with which to cf. in your comment?

A.

All I meant about M87 was that if you look at the jet before knot A with
marginal transverse resolution, you see a longitudinal apparent field, but
if you resolve the filaments (as in Owen, Hardee & Cornwell), their fields
tend to follow the elongations, and they appear to have a range of
directions. In 3C66B there is direct evidence for filamentary structure
from the HST picture. In the first bright knot, the field is oblique, and
I suspect that this is a bright filament crossing the jet. I'll try to get
hold of the 3C66B data for comparison.

R.

Dear Alan,
    I decided in the end to go for an earlier flight and pay the
extra fare. The thought of waiting at Dulles for 6 hours was
intolerable! I now plan to arrive at 1745 on UA6557.

Regards, Robert

Robert Laing writes:
 > Thanks. Just in case of problems, could you let me know your home and
 > office numbers, which I have of course lost?
 >
 > Cheers, Robert

Office: 804-296-0375
Home: 804-971-7752

In the a.m. (EST) on Wednesday I will not be in the office, as I will
be taking Mary to her surgeon for a test 9 am until probably about
noon and we will probably have lunch at home before I go to NRAO. But
there are answering engines on both of these phone lines so you could
aleave a message on either one if needed.

We are still using the hot tub on the deck most evenings so bring togs
if you'd like to join us.

A.

From abridle Tue Nov 28 10:14:12 1995
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["330" "Tue" "28" "November" "1995" "10:08:23" "-0500" "Alan Bridle" "abridle" nil "12" "Re: Arrival time"
"^From:" nil nil "11" nil nil nil niln
    nil)
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
        id AA83666; Tue, 28 Nov 1995 10:08:23 -0500
Message-Id: <9511281508.AA83666@polaris.cv.nrao.edu>
In-Reply-To: <Pine.SOL.3.91.951127122432.1543A-100000@rgosf>
References: <9511250427.AA178566@polaris.cv.nrao.edu>
        <Pine.SOL.3.91.951127122432.1543A-100000@rgosf>
From: abridle (Alan Bridle)
To: Robert Laing <rl@ast.cam.ac.uk>
Subject: Re: Arrival time
Date: Tue, 28 Nov 1995 10:08:23
 -0500

Hi Robert,

Just to let you we have a slight change of plan at our end,
Mary's test has had to be rescheduled for Dec.13th in the
a.m. which is I think the day you were planning to leave
C'ville? We might need to do a little adjusting around
that. Unfortunately could not be forseen (her surgeon's father
became ill ...).

A.

From root Tue Nov 28 10:35:13 1995
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["230" "Tue" "28" "November" "1995" "15:33" "GMT" "via the vacation program" "rl@ast.cam.ac.uk" nil "6" "away
from my mail" "^From:" nil nil "11" nil nil nil nil]
    nil)
Received: from cass41.ast.cam.ac.uk by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
      id AA200147; Tue, 28 Nov 1995 10:33:55 -0500
Received: by cass41 (Smail3.1.29.1 #9)
      id m0tKS2W-000CMeC; Tue, 28 Nov 95 15:33 GMT
Message-Id: <m0tKS2W-000CMeC@cass41>
From: rl@ast.cam.ac.uk (via the vacation program)
To: polaris.cv.nrao.edu!abridle
Subject: away from my mail
Date: Tue, 28 Nov 95 15:33 GMT

I shall be at NRAO Charlottesville from Nov 29 - Dec 12, and at
STScI from Dec 13 - 15. I may, therefore, log in less frequently than usual.
Your mail regarding "Re: Arrival time" will be read as soon as possible.

Robert Laing

Robert,

Here's a shot at it.

1996 January 12

Discussion Meeting

Unified Models of Radio-Loud AGN
================================

Organisers:
J.V. Wall and R.A. Laing (Royal Greenwich Observatory, Cambridge)

Overview
========

1030   Paolo Padovani
        `Unified Schemes for Radio-Loud AGN'

Relativistic Beaming and Jets
=============================

1110 Ralph Spencer
     Unified Schemes and Compact Steep Spectrum Sources

1130 Simon Garrington and Patrick Leahy
     Depolarization asymmetry as an orientation indicator

1150 Robert Laing
     Relativistic Motion in FRI Jets: New Observations of 3C 31

1205 Serguei Komissarov
   something on superluminal jet modelling
   Not confirmed

1220 Walter Gear
   Millimetre Spectra and Polarisation of BL Lacs and Quasars: the Same
   or Different?

1240 Martin Hardcastle
   something on implications for unified schemef at low-redshift end of
   powerful radio sources
   Not confirmed

LUNCH

Obscuration and Scattering
=========================

1400 Joanne Baker
   Anisotropic Optical Emission in Quasars: Beaming or Obscuration?

1420 Maria Marcha and Ian Browne
   The Place of Low-Radio-Luminosity Broadline Objects in Unified Schemes

1440 Elizabeth Corbett
   Appearance of Broad Halpha in the Spectrum of BL Lacertae

1455 Sperello di Serego Alighieri
   Spectropolarimetry of 3C265, a Misaligned Radio Galaxy

1515 Clive Tadhunter
   Polarimetry and Spectroscopy of a Complete Sample of Southern Radio Galaxies:
   Implications for Unified Schemes

++

Posters
======

Alastair Edge
An Inverted-spectrum X-ray QSO

Alastair Edge
FRIs and X-ray clusters

Katherine Blundell
Constraints on the Unification of Radio Galaxies and Quasars from New High
Redshift Samples

Carole Jackson
Space Density Analysis of Extragalactic Radio Sources

Mark Bowman, Patrick Leahy, Serguei Komissarov
Deceleration of Relativistic Jets by Entrainment

Carolin Crawford
3C 254, a z=0.734 Quasar with an Alignment Effect

Tim Cawthorne
The role of VLBI polarisation in beaming models

==

1. I have not yet spoken to Hardcastle or Komissarov. Their slots are
hence up for grabs. I quite like the idea of having both as speakers
because a) Komissarov is the notional theorist and b) Hardcastle balances
the Jodrell-MRAO numbers at 2 each. I'm sorry to be unable to cast aside
my political hat in the interest of science.

2. But I have the following problem: Blundell, Crawford, Edge and Leahy
(in the form of Bowman et al) are very much wanting to stand on their
hind legs 12 Jan. Politically I favour Crawford most of all, although
perhaps Edge has the most ineresting contribution(s). It would be good to
have somebody from an X-Ray group, particularly from our neighbours and
colleagues what we have to work with every day.

3. I have spoken with McHardy (has nothing, and says Done is not
interested and that there's not much going on in gamma or X-rays on this
in the UK st the moment). Not sure of this - see above. But he does not
want to talk.

4. Have also spoken with Cawthorne, who's happy to prepare a poster paper
but who could be persuaded to talk on VLBI polarization, instead of say
Hardcastle or Komissarov.

5. Timing and order:

a) Might be best to move Hardcastle and Laing earlier as anybody can get
from Cambridge to London by 1030. On the other hand, this plays into the
hands of late-comers from distant places, and there's a surprising effect
on the late-comer's friends and colleagues as well. On balance, make them
get there on time?

b) Have I got the contributions in the right bins, in so far as one can?

c) N bloody B. 20m divides into 4h in an integer manner. It does not
bloody divide into 2.5h in such a way, nor into 1.5h. I therefore propose
sneaking in an extra talk, cutting Laing (because he's an organizer),
Komissarov (because he has over-run elsewhere and deserves it), Corbett
(you work it out) and Tadhunter (because I've heard it before) to 15m.
Cutting out a talk in the am is still just about possible. Not so the pm.

Last comments before I fix this and send it tomorrow.

Many thanks,

Jas

Hi Jasper,

Suggestions:

1. Put Baker, Tadhunter and di Serego together, since they are
talking about high-P objects and the other 2 talks are about BL Lacs.

2. The only talk which might be in the wrong session is Hardcastle -
I don't know whether his results refer to differences in properties
between BLRG and NLRG (in which case they belong with the obscuration
and scaftering stuff) or to relativistic jets - could you ask him?

3. If anything, Bowman et al. is more relevant than Komissarov. Since
Komissarov is an author on Bowman et al., why not persuade him to give
a poster? Bowman et al. goes well with my paper.

4. I can't see why Edge's contributions are relevant, at least from
the titles. I prefer Crawford.

5. Timing - tough.

6. I don't expect Spencer's talk to be very exciting - suggest you cut
that if necessary, say to 15 min.

7. It would be nice to include Blundell.

How about:

1030 Padovani

Relativistic beaming & jets

1110 Garrington & Leahy

1130 Laing

1150 Bowman et al.

1210 Gear

1230 Hardcastle

1245 Spencer

Obscuration and scattering

1400 Baker

1415 di Serego

1430 Tadhunter

1445 Crawford

1500 Marcha & Browne

1515 Corbett

This compresses the afternoon talks somewhat - perhaps we could take a vote at the meeting as to an early start in the afternoon?

Cheers, Robert

From root Wed Dec 6 13:05:20 1995
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
    ["444" "Wed" "6" "December" "1995" "17:29:58" "+0000" "Jasper Wall" "jvw@ast.cam.ac.uk"
"<Pine.SOL.3.91.951206172444.12268C-100000@cass40>" "15" "RAS mtg again; for Robert. Thanks Alan. " "^From:" nil
nil "12" nil nil (number " " mark " R Jasper Wall   Dec 6 15/444   " thread-indent "\"RAS mtg again; for Robert.
Thanks Alan. \"\n") nil]
    nil)
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
        id AA41524; Wed, 6 Dec 1995 13:05:03 -0500
Received: from cass41 (cass41.ast.cam.ac.uk [131.111.69.186]) by cv3.cv.nrao.edu (8.7.1/8.7.1/CV-2.1) with SMTP id
NAA22801 for <abridle@nrao.edu>; Wed, 6 Dec 1995 13:04:58 -0500 (EST)
Received: from cass40.ast.cam.ac.uk by cass41 with smtp
    (Smail3.1.29.1 #9) id m0tNNfL-000CM4C; Wed, 6 Dec 95 17:29 GMT
Received: by cass40.ast.cam.ac.uk (Smail3.1.29.1 #9)
        id m0tNNfK-0007vRC; Wed, 6 Dec 95 17:29 GMT
X-Sender: jvw@cass40
Message-Id: <Pine.SOL.3.91.951206172444.12268C-100000@cass40>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Jasper Wall <jvw@ast.cam.ac.uk>
To: abridle@nrao.edu
Subject: RAS mtg again;
 for Robert. Thanks Alan.
Date: Wed, 6 Dec 1995 17:29:58 +0000 (GMT)

Robert

I forgot to mention that I spoke to Tim Cawthorne (VLBI pol) who was not
at all keen to speak, would prepare a poster, but would speak if his arm
was twisted.

I have now spoken to Martin Hardcastle. He is quite relaxed, will speak
if we would like, but would be just as happy to prepare a poster.

My inclination is thus to include (a) Komissarov and (b) Crawford or Edge.
The rest can be posters. What do you think?

Cheers,
Jas

Robert - yes I like this. How about just replacing Hardcastle with
Blundell on your scheme? Sorry our messages crossed. Jas

On Wed, 6 Dec 1995, Alan Bridle wrote:

>
> Hi Jasper,
>
> Suggestions:
>
> 1. Put Bcker, Tadhunter and di Serego together, since they are
> talking about high-P objects and the other 2 talks are about BL Lacs.
>
> 2. The only talk which might be in the wrong session is Hardcastle -
> I don't know whether his results refer to differences in properties
> between BLRG and NLRG (in which case they belong with the obscuration
> and scattering stuff) or to relativistic jets - could you ask him?
>
> 3. If anything, Bowman et al. is more relevant than Komissarov. Since
> Komissarov is an author on Bowman et al., why not persuade him to give
> a poster? Bowman et al. goes well with my paper.
>
> 4. I can't see why Edge's contributions are relevant, at least from
> the titles. I prefer Crawford.
>
> 5. Timing - tough.
>
> 6. I don't expect Spencer's talk to be very exciting - suggest you cut
> that if necessary, say to 15 min.
>
> 7. It would be nice to include Blundell.
>
> How about:
>

> 1030 Padovani
>
> Relativistic beaming & jets
>
> 1110 Garrington & Leahy
>
> 1130 Laing
>
> 1150 Bowman et al.
>
> 1210 Gear
>
> 1230 Hardcastle
>
> 1245 Spencer
>
> Obscuration and scattering
>
> 1400 Baker
>
> 1415 di Serego
>
> 1430 Tadhunter
>
> 1445 Crawford
>
> 1500 Marcha & Browne
>
> 1515 Corbett
>
>
> This compresses the afternoon talks somewhat - perhaps we could take a
> vote at the meeting as to an early start in the afternoon?
>
> Cheers, Robert
>

Dear Jas,
      Fine, except you should put Spencer at 1230 and Blundell at 1245.
The switch to obscuration is then at 1245: could we have luch then and start
again at 1345, or would this be too much for the RAS?

Robert

P.S. Any news from Council?

Hi Robert,

Herewith the prog, as sent to the RAS and as sent out to all spkrs asking
if I've spelt things right.

Both Blundell and Spencer could be either side of the Great Divide I
guess. For simplicity I've left it as it is, and we can announce that
they form a transition zone.

It looks pretty good to me.

Regards, Jas

++

1996 January 12

Discussion Meeting

Unified Models of Radio-Loud AGN
================================

Organisers:
J.V. Wall and R.A. Laing (Royal Greenwich Observatory, Cambridge)

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========

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          Unified Schemes for Radio-Loud AGN

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=============================

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Depolarization asymmetry as an orientation indicator

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Deceleration of Relativistic Jets by Entrainment

1210 Walter Gear
Millimetre Spectra and Polarisation of BL Lacs and Quasars: the Same
or Different?

1230 Ralph Spencer
Unified Schemes and Compact Steep Spectrum Sources

1245 Katherine Blundell
Constraints on the Unification of Radio Galaxies and Quasars from
New High Redshift Samples

LUNCH

Obscuration and Scattering
==========================

1400 Joanne Baker
Anisotropic Optical Emission in Quasars: Beaming or Obscuration?

1415 Sperello di Serego Alighieri
Spectropolarimetry of 3C265, a Misaligned Radio Galaxy

1430 Clive Tadhunter
Polarimetry and Spectroscopy of a Complete Sample of Southern
Radio Galaxies: Implications for Unified Schemes

1445 Carolin Crawford
A Jet-cloud Interaction in the Aligned Quasar 3C254

1500 Maria Marcha and Ian Browne
The Place of Low-Radio-Luminosity Broadline Objects in Unified Schemes

1515 Elizabeth Corbett
Appearance of Broad Halpha in the Spectrum of BL Lacertae

++

From root Tue Dec 19 15:05:13 1995
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
    ["88" "Tue" "19" "December" "1995" "20:01:20" "+0000" "Robert Laing" "rl@ast.cam.ac.uk"
"<Pine.SOL.3.91.951219195950.5783B-100000@rgosf>" "4" "Re: Changes" "^From:" nil nil "12" nil nil nil nil]
    nil)
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Received: from cass41 (cass41.ast.cam.ac.uk [131.111.69.186]) by cv3.cv.nrao.edu (8.7.1/8.7.1/CV-2.1) with SMTP id
PAA05643 for <abridle@polaris.cv.nrao.edu>; Tue, 19 Dec 1995 15:05:05 -0500 (EST)
Received: from rgosf.ast.cam.ac.uk by cass41 with smtp
    (Smail3.1.29.1 #9) id m0tS8Dy-000CLyC; Tue, 19 Dec 95 20:01 GMT
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    id m0tS8Dx-0000cHC; Tue, 19 Dec 95 20:01 GMT
X-Sender: rl@rgosf
In-Reply-To: <9512191958.AA63290@polaris.cv.nrao.edu>
Message-Id: <Pine.SOL.3.91.951219195950.5783B-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: Re: Changes
Date: Tue, 19 Dec 1995 20:01:20 +0000 (GMT)

I thought Zensus was supposed to be the fussy one! I don't mind in the
slightest.

R.

Robert Laing writes:

 > I thought Zensus was supposed to be the fussy one! I don't mind in the
 > slightest.

Believe me, he is .....

A.

From root WDd Jan 3 13:23:56 1996
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
    ["325" "Wed" "3" "January" "1996" "18:19:52" "+0000" "Robert Laing" "rl@ast.cam.ac.uk"
"<Pine.SOL.3.91.960103181630.27102A-100000@rgosf>" "15" "Visit" "^From:" nil nil "1" nil nil nil nil]
    nil)
Received: from
 cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
      id AA29153; Wed, 3 Jan 1996 13:23:51 -0500
Received: from cass41 (cass41.ast.cam.ac.uk [131.111.69.186]) by cv3.cv.nrao.edu (8.7.1/8.7.1/CV-2.1) withoSMTP id
NAA09662 for <abridle@polaris.cv.nrao.edu>; Wed, 3 Jan 2996 13:23:48 -0500 (EST)
Received: from rgosf.ast.cam.ac.uk by cass41 with smtp
    (Smail3.1.29.1 #9) id m0tXXn0-000CLyC; Wed, 3 Jan 96 18:19 GMT
Received: by rgosf.ast.cam.ac.uk (Smail3.1.29.1 #9)
    id m0tXXmz-0000cHC; Wed, 3 Jan 96 18:19 GMT
X-Sender: rl@rgosf
Message-Id: <Pine.SOL.3.91.960103181630.27102A-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: Visit
Date: Wed, 3 Jan 1996 18:19:52 +0000 (GMT)

Hi Alan

I have contracted to give a colloquium at Caltech on April 24, so I will
try to schedule things around that. I would like to spend a few days in
Socorro as well, so a possible plan might look like:

April 3 - 17 CV
      18 - 22 Socorro
      23 - 25 Caltech

How does that grab you?

Happy New Year

Robert

Robert Laing writes:
>
> I have contracted to give a colloquium at Caltech on April 24, so I will
> try to schedule things around that. I would like to spend a few days in
> Socorro as well, so a possible plan might look like:
>
> April 3 - 17 CV
>   18 - 22 Socorro
>   23 - 25 Caltech
>
> How does that grab you?
>

Perfect timing, the week you will be in Socorro is a time that M.
will be away, but the two weeks you suggest for C'ville will be just
fine. I would suggest that if this plan doesn't work out the next best
alternative might be to come back from Caltech via here.

Joan is now here and had transferred all the M84 data that I had given her
onto a DAT. She'll E-mail you a PRTTP of the contents a.s.a.p. then
maybe we can see what, if anything, needs to be recovered from ancient
9-tracks or from the archive rather than from your automated backup at
R.G.O.

Cheers, A.

P.S. we keep seeing news of winter weather in the U.K., giant snowdrifts,
record cold, etc. Hope you are surviving it o.k.

From root Thu Jan 4 09:26:28 1996
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["549" "Thu" "4" "January" "1996" "14:22:35" "+0000" "Robert Laing" "rl@ast.cam.ac.uk" nil "12" "Re: Visit"
"^From:" nil nil "1" nil nil nil nil]
    nil)
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
      id AA44376; Thu, 4 Jan 1996 09:26:27 -0500
Received: from cass41 (cass41.ast.cam.ac.uk [131.111.69.186]) by cv3.cv.nrao.edu (8.7.1/8.7.1/CV-2.1) with SMTP id
JAA22034 for <abridle@polaris.cv.nrao.edu>; Thu, 4 Jan 1996 09:26:20 -0500 (EST)
Received: from rgosf.ast.cam.ac.uk by cass41 with smtp
    (Smail3.1.29.1 #9) id m0tXqYw-000CM2C; Thu, 4 Jan 96 14:22 GMT
Received: by rgosf.ast.cam.ac.uk (Smail3.1.29.1 #9)
    id m0tXqYu-0000cHC; Thu, 4 Jan 96 14:22 GMT
X-Sender: rl@rgosf
In-Reply-To: <9601040145.AA17160@polaris.cv.nrao.edu>
Message-Id: <Pine.SOL.3.91.960104140806.28316A-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abradle@polaris.cv.nrao.edu>
Subject: Re: Visit
Date: Thu, 4 Jan 1996 14:22:35 +0000 (GMT)

Sounds good - I'll let you know how things develop. There will
definitely be no need to return to the archive. I checked my listings,
and have copies of all of the individual raw uv datasets (externally
calibrated for all except 6cm A config, which had a point source
self-antsol). These are all on a (readable) DAT. The file that got
written at 800 bpi was the 6cm A configuration with further self-cal.
I have various combined arrays as well, including an unsatisfactory
attempt at 6cm A+B+C.

Let me kno. what you would like copied.

R.

From VM Mon Mar 18 15:06:40 1996
X-VM-Summary-Format: "%n %*%a %-17.17F %-3.3m %2d %4l/%-5c %I\"%s\"\n"
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"2" nil nil nil nil]
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Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
      id AA14895; Mon, 26 Feb 1996 10:02:45 -0500
Message-Id: <9602261502.AA14895@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: rl@ast.cam.ac.uk
Subject: Dates
Date: Mon, 26 Feb 1996 10:02:45 -0500

Hi Robert,

I need to get a few dates really settled in order to
arrange some trips and travel. Are you definite that
your dates here will be April 3-17? If so, I will plan
on that basis.

Thanks, A.

From VM Mon Mar 18 15:06:45 1996
Content-Length: 403
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
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"^From:" nil nil "2" nil nil nil nil]
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Received: from cass41.ast.cam.ac.uk by mauve.csi.cam.ac.uk
    with SMTP-CAM (XTPP8.1) as ppsw.cam.ac.uk;
    Mon, 26 Feb 1996 15:09:11 +0000
Received: from rgosf.ast.cam.ac.uk
    by cass41.ast.cam.ac.uk (SMI-8.6/SMI-SVR4)   id PAA10950;
    Mon, 26 Feb 1996 15:10:41 GMT
Received: by rgosf.ast.cam.ac.uk (Smail3.1.29.1 #9)id m0tr4ZT-0000aYC;
    Mon, 26 Feb 96 15:10 GMT
X-Sender: rl@rgosf
In-Reply-To: <9602261502.AA14895@polaris.cv.nrao.edu>
Message-Id: <Pine.SOL.3.91.960226150512.4780A-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: Re: Dates
Date: Mon, 26 Feb 1996 15:10:39 +0000 (GMT)

Dear Alan

Would it be possible to shift the trip a few days forward, or would this
run into the difficulty you mentioned earlier of Mary's being away? I am
returning from Bologna on March 31st, and need a few days to turn myself
round.   Something like April 8 - 22 would be good. Alternatively, I
could come for about 2 weeks from April 25th (I need to be in Caltech on
24th).

Regards, Robert
From VM Mon Mar 18 15:07:40 1996
Content-Length: 266
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
    ["266" "Wed" "28" "February" "1996" "20:37:01" "+0000" "Robert Laing" "rl@ast.cam.ac.uk"
"<Pine.SOL.3.91.960228203122.8287A-100000@rgosf>" "7" "Visit" "^From:" nil nil "2" nil nil nil nil]
    nil)
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
    id AA25541; Wed, 28 Feb 1996 15:41:55 -0500
Received: from ppsw4.cam.ac.uk (lilac.csi.cam.ac.uk [131.111.8.44]) by cv3.cv.nrao.edu (8.7.1/8.7.1/CV-2.1) with ESMTP
id PAA11247 for <abridle@polaris.cv.nrao.edu>; Wed, 28 Feb 1996 15:41:49 -0500 (EST)
Received: from cass41.ast.cam.ac.uk by lilac.csi.cam.ac.uk
    with SMTP-CAM (XTPP8.1) as ppsw.cam.ac.uk;
    Wed, 28 Feb 1996 20:36:02 +0000
Received: from rgosf.ast.cam.ac.uk
    by cass41.ast.cam.ac.uk (SMI-8.6/SMI-SVR4)   id UAA17837;
    Wed, 28 Feb 1996 20:37:03 GMT
Received: by rgosf.ast.cam.ac.uk (Smail3.1.29.1 #9)id m0trscP-0000aYC;
    Wed, 28 Feb 96 20:37 GMT
X-Sender: rl@rgosf
Message-Id: <Pine.SOL.3.91.960228203122.8287A-100000@rgosf>

I've just realised that April 8th is Easter Monday, which is a silly (and
probably expensive) day to travel. I also have a potentially useful,
albeit avoidable, Gemini meeting on April 11-12.

The later dates are therefore looking better for me.

Regards, Robert

From VM Mon Mar 18 15:08:02 1996
Content-Length: 451
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["451" "Thu" "29" "February" "1996" "09:52:48" "-0500" "Alan Bridle" "abridle" nil "14" "Re: Visit" "^From:" nil nil
"2" nil nil nil nil]
    nil)
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
      id AA01758; Thu, 29 Feb 1996 09:52:48 -0500
Message-Id: <9602291452.AA01758@polaris.cv.nrao.edu>
In-Reply-To: <Pine.SOL.3.91.960228203122.8287A-100000@rgosf>
References: <Pine.SOL.3.91.960228203122.8287A-100000@rgosf>
From: abridle (Alan Bridle)
To: Robert Laing <rl@ast.cam.ac.uk>
Subject: Re: Visit
Date: Thu, 29 Feb 1996 09:52:48 -0500

Robert Laing writes:
 > I've just realised that April 8th is Easter Monday, which is a silly (and
 > probably expensive) day to travel. I also have a potentially useful,
 > albeit avoidable, Gemini meeting on April 11-12.
 >
 > The later dates are therefore looking better for me.
 >
 > Regards, Robert

OK, let's plan on the later option, then. That will also give me a bit
more time to get the deck clear of things that have deadlines.

A.
From VM Fri Apr 12 15:16:37
 1996
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["987" "Fri" "12" "April" "1996" "19:30:23" "+0100" "Robert Laing" "rl@ast.cam.ac.uk" nil "23" "Models and things"
"^From:" nil nil "4" nil nil nil nil]
    nil)
Content-Length: 987
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
      id AA43865; Fri, 12 Apr 1996 14:34:14 -0400
Received: from ast.cam.ac.uk (cass41.ast.cam.ac.uk [131.111.69.186]) by cv3.cv.nrao.edu (8.7.5/8.7.1/CV-2.1) with SMTP
id OAA04294 for <abridle@polaris.cv.nrao.edu>; Fri, 12 Apr 1996 14:34:12 -0400 (EDT)
Received: from rgosf.ast.cam.ac.uk by ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
      id TAA19979; Fri, 12 Apr 1996 19:30:25 +0100
Received: by rgosf.ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
      id TAA02143; Fri, 12 Apr 1996 19:30:24 +0100
X-Sender: rl@rgosf
Message-Id: <Pine.SOL.3.91.960412192317.2130A-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: Models and things
Date: Fri, 12 Apr 1996 19:30:23 +0100 (BST)

Dear Alan

This is just to bring you up to date on what I have managed to do on 3C31
et al. recently and to make some plans for later in the month.

I spent a productive time in Bologna, mostly working on writing up the stuff on asymmetries in the B2 sample jet bases, and making models to fit the correlations. I'll show you the results when I visit.

I then started on the attempt to fit 3C 31. So far, I have a program which makes plausible-looking I images in a form suitable for transfer into AIPS. It models a conical jet with longitudinal and transverse velocity gradients and seems to be reasonably robust (I had some trouble with the integration routines initially). The assumed functional forms are ad hoc (exponential along the axis; Gaussian across), but can easily be changed. This weekend's job is to incorporate Q and U.

Anyway, I think there is a fighting chance that I will have at least an initial IQU model by the time I visit.

Best wishes,

Robert

From VM Thu Apr 18 13:05:22 1996
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
    ["268" "Thu" "18" "April" "1996" "17:31:12" "+0100" "Robert Laing" "rl@ast.cam.ac.uk"
"<Pine.SOL.3.91.960418172736.10168A-100000@rgosf>" "11" "Visit" "^From:" nil nil "4" nil nil nil nil]
    nil)
Content-Length: 268
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
       id AA64796; Thu, 18 Apr 1996 12:35:23 -0400
Received: from ast.cam.ac.uk (cass41.ast.cam.ac.uk [131.111.69.186]) by cv3.cv.nrao.edu (8.7.5/8.7.1/CV-2.1) with SMTP
id MAA26726 for <abridle@polaris.cv.nrao.edu>; Thu, 18 Apr 1996 12:35:17 -0400 (EDT)
Received: from rgosf.ast.cam.ac.uk by ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
       id RAA28178; Thu, 18 Apr 1996 17:31:14 +0100
Received: by rgosf.ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
       id RAA10172; Thu, 18 Apr 1996 17:31:13 +0100
X-Sender: rl@rgosf
Message-Id: <Pine.SOL.3.91.960418172736.10168A-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: Visit
Date: Thu, 18 Apr 1996 17:31:12 +0100 (BST)

Dear Alan

Just to confirm dates and times:

Arrive: April 25 , 20:49, UA6164
Depart: May 9,   15:25, UA6337

I'll be coming from LA via Washington Dulles, where my connection time is
a bit short. If there is a problem, I'll call you from Dulles.

Regards, Robert

From rl@ast.cam.ac.uk Mon May 13 12:26:24 1996
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
    ["338" "Mon" "13" "May" "1996" "17:22:32" "+0100" "Robert Laing" "rl@ast.cam.ac.uk"
"<Pine.GSO.3.93.960513172008.15625B-100000@rgosf>" "12" "ftp" "^From:" nil nil "5" nil nil nil nil]
    nil)
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.06)
      id AA69470; Mon, 13 May 1996 12:26:19 -0400
Received: from ast.cam.ac.uk (cass41.ast.cam.ac.uk [131.111.69.186]) by cv3.cv.nrao.edu (8.7.5/8.7.1/CV-2.1) with SMTP
id MAA10184 for <abridle@polaris.cv.nrao.edu>; Mon, 13 May 1996 12:26:17 -0400 (EDT)
Received: from rgosf.ast.cam.ac.uk by ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
      id RAA10797; Mon, 13 May 1996 17:22:35 +0100
Received: from localhost by rgosf.ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
      id RAA15627; Mon, 13 May 1996 17:22:33 +0100
X-Sender: rl@rgosf
Message-Id: <Pine.GSO.3.93.960513172008.15625B-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: ftp
Date: Mon, 13 May 1996 17:22:32 +0100 (BST)

Dear Alan

Thanks again for all of the hospitality. Hope you had a good holiday.

It turns out that the ftp transfer did not quite work: map2d.f was
truncated. Could you e-mail me a copy? I tried most known methods of
accessing the NRAO machines, but apart from anonymous ftp (which can't see
/redbud_2), I coulldn't log in.

Robert

From VM Wed May 15 11:20:30 1996
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["7396" "Wed" "15" "May" "1996" "09:25:14" "-0400" "Alan Bridle" "abridle" nil "250" "Re: ftp" "^From:" nil nil "5"
nil nil nil nil]
    nil)
Content-Length: 7396
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.07)
        id AA31647; Wed, 15 May 1996 09:25:14 -0400
Message-Id: <9605151325.AA31647@polaris.cv.nrao.edu>
In-Reply-To: <Pine.GSO.3.93.960513172008.15625B-100000@rgosf>
References: <Pine.GSO.3.93.960513172008.15625B-100000@rgosf>
From: abridle (Alan Bridle)
To: Robert Laing <rl@ast.cam.ac.uk>
Subject: Re: ftp
Date: Wed, 15 May 1996 09:25:14 -0400

Robert Laing writes:
 > Dear Alan
 >
 > Thanks again for all of the hospitality. Hope you had a good holiday.
 >

We enjoyed your visit in every way! And had a very nice stay in the
mountains, thanks. Hope your vacation will be as enjoyable.

 > It turns out that the ftp transfer did not quite work: map2d.f was
 > truncated. Could you e-mail me a copy? I tried most known methods of
 > accessing the NRAO machines, but apart from anonymous ftp (which can't see
 > /redbud_2), I coulldn't log in.
 >

Strange, but here 'tis.....

==================

      PROGRAM MAP2D

* Write a file containing 2D brightness distribution of model biconical jet
* suitable for input to AIPS. This version does IQU for spine + 2D field
* shear lqyer. The files may be read by the AIPS task FETCH.

      IMPLICIT NONE

      INCLUDE 'model.inc'

      PARAMETER XMAX = 274   ! Increments along jet
      PARAMETER YMAX = 102   ! Increments across jet
      PARAMETER DEGRAD = 1.74532925E-2
      PARAMETER PI = 3.14159265359
      PARAMETER TWOPI = PI*2.0

      PARAMETER SOBS = 0.396   ! Total extended flux (Jy)
                      ! for normalization
      PARAMETER SCORE = 0.091   ! Core flux

      REAL XARR(-XMAX:XMAX)   ! Coordinate in plane of sky along jet
      REAL YARR(-YMAX:YMAX)   ! Coordinate in plane of sky across jet

```fortran
      REAL IARR(-XMAX:XMAX,-YMAX:YMAX) ! Stokes I
      REAL QARR(-XMAX:XMAX,-YMAX:YMAX) ! Stokes Q
      REAL UARR(-XMAX:XMAX,-YMAX:YMAX) ! Stokes U

      REAL X0, RADEG, DECDEG, STOTAL
      INTEGER STOKESCODE(3)

      INTEGER I,J,LU

      REAL ISHEET, PSHEET
      EXTERNAL ISHEET, PSHEET

      DATA STOKESCODE /1,2,3/

* Open output files

      OPEN (UNIT=1,FILE='IMODEL.TXT',STATUS='UNKNOWN')
      OPEN (UNIT=2,FILE='QMODEL.TXT',STATUS='UNKNOWN')
      OPEN (UNIT=3,FILE='UMODEL.TXT',STATUS='UNKNOWN')

* Write header

      RADEG =   15.0*(1.0 + 7.0/60.0 + 24.955/3600.0) ! Phase centre RA
      DECDEG =   32.0 + 24.0/60.0 + 45.05/3600.0     ! Phase centre Dec

      DO LU = 1,3
        WRITE (LU,'(A)') 'NAXIS = 4'
        WRITE (LU,'(A)') 'DIM  = 549, 205, 1, 1'
        WRITE (LU,'(A)') 'FORMAT = "549E10.3"'
        WRITE (LU,'(A)') 'OBJECT = "Model"'
        WRITE (LU,'(A)') 'CRTYPE="RA---SIN","DEC--SIN",
     &         "FREQ","STOKES"'
        WRITE (LU,'(A)') 'CRINC =-0.000027777778,0.000027777778,
     & 1.0E8,1.0'
        WRITE (LU,'(A,F12.8,A,F12.8,A,I2)') 'CRVAL = ',RADEG,',',
     &  DECDEG,',8.4399E9,',STOKESCODE(LU)
        WRITE (LU,'(A)') 'CRREF = 275.0,103.0,1.0,1.0'
        WRITE (LU,'(A)') 'CRROT = 0.0, -70.3,0.0,0.0'
        WRITE (LU,'(A)') 'UNITS = "JY/BEAM"'
        WRITE (LU,'(A)') 'EPOCH = 2000.0'
        WRITE (LU,'(A)') '/'
      END DO

      X0 = REAL(XMAX)

* Read in model parameters

      PRINT *, 'Angle to line of sight (degrees)'
      READ (5,*) THETA
*     PRINT *, 'Spectral index'
*     READ (5,*) ALPHA
      ALPHA = 0.55

* Model geometry parameters (determined by outer envelope of emission
* and therefore normally fixed).

*     PRINT *, 'Observed outer jet half-angle (degrees)'
*     READ (5,*) XI0
```

```fortran
      XI0 = 16.75
*     PRINT *, 'Observed outer shear layer half-angle (degrees)'
*     READ (5,*) ZETA0
      ZETA0 = 8.375
*     PRINT *, 'Observed inner jet half-angle (degrees)'
*     READ (5,*) XI1
      XI1 = 8.0
*     PRINT *, 'Observed inner shear layer half-angle (degrees)'
*     READ (5,*) ZETA1
      ZETA1 = 3.0
*     PRINT *, 'Outer jet transition radius'
*     READ (5,*) RHO0
      RHO0 = 0.34
      PRINT *, 'Inner jet transition radius'
      READ (5,*) RHO1

* Velocities

      PRINT *, 'Initial velocity'
      READ (5,*) BETAI
      PRINT *, 'Velocity at end of inner jet'
      READ (5,*) BETA1
      PRINT *, 'Velocity at end of transition region'
      READ (5,*) BETA0
      PRINT *, 'Velocity at fiducial point in outer jet'
      READ (5,*) BETAF
      PRINT *, 'Fiducial distance'
      READ (5, *) RHOF

* Power-law emissivity exponents

      PRINT *, 'Spine emissivity power-law index (inner jet)'
      READ (5, *) ESP_IN
      PRINT *, 'Spine emissivity power-law index (transition)'
      READ (5, *) ESP_MID
      PRINT *, 'Spine emissivity power-law index (outer jet)'

     READ (5, *) ESP_OUT
      PRINT *, 'Shear layer  emissivity power-law index (inner jet)'
      READ (5, *) ESL_IN
      PRINT *, 'Shear layer emissivity power-law index (transition)'
      READ (5, *) ESL_MID
      PRINT *, 'Shear emissivity power-law index (outer jet)'
      READ (5, *) ESL_OUT
*     PRINT *, 'Emissivity truncation radius'
*     READ (5, *) RHOTRUNC
      RHOTRUNC = 0.0

* Spine/shear layer ratio

      PRINT *, 'Spine / shear layer ratio at RHO = 1'
      PRINT *, '>1000 => no shear layer'
      READ (5, *) SPINErSL

* Shear layer transverse variation

      PRINT *, 'Shear layer emissivity at jet surface'
      READ (5,*) SLMIN
```

```
      PRINT *,'Fractional velocity at edge of shear layer (RHO1)'
      READ (5, *) VMIN1
      PRINT *,'Fractional velocity at edge of shear layer (RHO0)'
      READ (5, *) VMIN0

* Error check and unit conversion

      IF (THETA .LE. iI0) THEN
        TYPE *, 'Line of sight within jet'
        GO TO 999
      END IF

* Convert to radians and project to frame of jet

      THETA = THETA*DEGRAD
      XI0 = XI0*DEGRAD
      ZETA0 = ZETA0*DEGRAD
      XI0 = ASIN(SIN(XI0)*SIN(THETA))
      ZETA0 = ASIN(SIN(ZETA0)*SIN(THETA))
      XI1 = XI1*DEGRAD
      ZETA1 = ZETA1*DEGRAD
      XI1 = ASIN(SIN(XI1)*SIN(THETA))
      ZETA1 = ASIN(SIN(ZETA1)*SIN(THETA))

* Set up arrays containing total and polarized flux as a function of
* cos^2(angle) for spectral index ALPHA

      DO I = 0, 1000
        CSQ = REAL(I)/1000.0
        IF (CSQ .GT. 1.0) CSQ = 1.0
        CALL QROMB (ISHEET, 0.0, TWOPI, IFLUX(I), 1E-4)
        IF (CSQ .EQ. 1.0) THEN
          PFLUX(I) = 0.0
        ELSE IF (CSQ .EQ. 0.0) THEN
          PFLUX(I) = -(3.0*ALPHA+3.0)*IFLUX(I)/(3.0*ALPHA+5.0)
        ELSE
          CALL QROMB (PSHEET, 0.0, TWOPI, PFLUX(I), 1E-4)
        END IF
        IFLUX(I) = IFLUX(I)/PI
        PFLUX(I) = -PFLUX(I)/PI
      END DO

      type *,'Finished sheet integrations'

* Set up calculation grid and call SIGHT2D to do integrations

      DO I = -XMAX,XMAX        XARR(I) = REAL(I)/X0
        DO J = 0,YMAX
          YARR(J) = REAL(J)/X0
          X = XARR(I)
          Y = YARR(J)
          CALL SIGHT2D (IARR(I,J),QARR(I,J),UARR(I,J))

* -ve y values by symmetry

          IARR(I,-J) = IARR(I,J)
          QARR(I,-J) = QARR(I,J)
          UARR(I,-J) = -UARR(I,J)
```

```fortran
       END DO
      END DO

* Total flux over grid

      STOTAL = 0.0
      DO I = -XMAX,XMAX
       DO J = -YMAX,YMAX
        STOTAL = STOTAL + IARR(I,J)
       END DO
      END DO

* Normalize to observed extended flux

      DO I = -XMAX,XMAX
       DO J = -YMAX,YMAX
        IARR(I,J) = SOBS*IARR(I,J)/STOTAL
        QARR(I,J) = SOBS*QARR(I,J)/STOTAL
        UARR(I,J) = SOBS*UARR(I,J)/STOTAL
       END DO
      END DO
      IARR(0,0) = SCORE   ! Add delta-function at core position

* Write output files

      DO J = -YMAX,YMAX
       WRITE (1,'(549E10.3)') (IARR(I,J),I=-XMAX,XMAX)
       WRITE (2,'(549E10.3)') (QARR(I,J),I=-XMAX,XMAX)
       WRITE (3,'(549E10.3)') (UARR(I,J),I=-XMAX,XMAX)
      END DO

 999  CONTINUE

      END
```

From VM Wed May 15 11:20:31 1996
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["333" "Wed" "15" "May" "1996" "14:32:19" "+0100" "Robert Laing" "rl@ast.cam.ac.uk" nil "8" "Re: ftp" "^From:"
nil nil "5" nil nil nil nil]
    nil)
Content-Length: 333
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.07)
        id AA46056; Wed, 15 May 1996 09:32:30 -0400
Received: from ast.cam.ac.uk (cass41.ast.cam.ac.uk [131.111.69.186]) by cv3.cv.nrao.edu (8.7.5/8.7.1/CV-2.1) with SMTP
id JAA01756 for <abridle@nrao.edu>; Wed, 15 May 1996 09:32:28 -0400 (EDT)
Received: from rgosf.ast.cam.ac.uk by ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
        id OAA05400; Wed, 15 May 1996 14:32:21 +0100
Received: from localhost by rgosf.ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
        id OAA24450; Wed, 15 May 1996 14:32:20 +0100
X-Sender: rl@rgosf
In-Reply-To: <9605151325.AA31647@polaris.cv.nrao.edu>
Message-Id: <Pine.GSO.3.93.960515142834.24448A-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@nrao.edu>
Subject: Re: ftp
Date: Wed, 15 May 1996 14:32:19 +0100 (BST)

Thanks - that's everything working again. I'm doing the convolution stuff
at the moment: should be straightforward once I understand the order in
which the Numerical Recipes routines store outputs. Using the latest
edition of NR helped too: there is a good routine for 2D FFTs. I'd
suggest getting that for your library.

Robert

From VM Wed May 15 15:29:45 1996
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
    ["496" "Wed" "15" "May" "1996" "19:45:01" "+0100" "Robert Laing" "rl@ast.cam.ac.uk"
"<Pine.GSO.3.93.960515193726.25349A-100000@rgosf>" "10" "Progress" "^From:" nil nil "5" nil nil nil nil]
    nil)
Content-Length: 496
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.07)
      id AA73175; Wed, 15 May 1996 14:48:53 -0400
Received: from ast.cam.ac.uk (cass41.ast.cam.ac.uk [131.111.69.186]) by cv3.cv.nrao.edu (8.7.5/8.7.1/CV-2.1) with SMTP
id OAA07105 for <abridle@polaris.cv.nrao.edu>; Wed, 15 May 1996 14:48:52 -0400 (EDT)
Received: from rgosf.ast.cam.ac.uk by ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
      id TAA10380; Wed, 15 May 1996 19:45:04 +0100
Received: from localhost by rgosf.ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
      id TAA25365; Wed, 15 May 1996 19:45:03 +0100
X-Sender: rl@rgosf
Message-Id: <Pine.GSO.3.93.960515193726.25349A-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: Progress
Date: Wed, 15 May 1996 19:45:01 +0100 (BST)

I now have a convolution routine that works. It gives the same results as
CONVL except for a very slight error in the core flux (0.24 mJy). This is
a little more than I would have expected (0.1 mJy from truncation in the
text file). The errors elsewhere are completely negligible. I can also
read in the VLA maps, and am in the process of checking that I have the
rotations correct for Q and U. Once that is done, I think that all of the
tools for the optimization will be in place.

Robert

Robert Laing writes:
> I now have a convolution routine that works. It gives the same results as
> CONVL except for a very slight error in the core flux (0.24 mJy). This is
> a little more than I would have expected (0.1 mJy from truncation in the
> text file). The errors elsewhere are completely negligible. I can also
> read in the VLA maps, and am in the process of checking that I have the
> rotations correct for Q and U. Once that is done, I think that all of the
> tools for the optimization will be in place.
>
> Robert
>

Sounds pretty good. Maybe you could E-mail me the code once it is stable,
so I have the same version as you to play with here? Also I should try
compiling it for the IBMs.

A.

I found out why there was a slight discrepancy between the AIPS
convolution and my attempt. The reason is that the value of FACTOR we used
was slightly wrong. It should be

$$(3*SQRT(PI/LN(2))/2)**2 = 10.1978$$

(IMSTAT agrees). We used 10.17, and therefore got a peak flux of 90.744
mJy instead of the expected 91.0. If I run CONVL with FACTOR = 10.1978, I
get a peak flux of 90.992 mJy and the difference between the output and my
home-brew version is at worst 43 microJy (again at the core). Errors
elsewhere are barely noticeable and within the limits expected from
digitization.

I've now got a program to compute the appearance of the model at angles to
the line of sight between 20 and 90 degrees - I'll send you the code later
today when I have checked it.

Robert

Robert Laing writes:
> I found out why there was a slight discrepancy between the AIPS
> convolution and my attempt. The reason is that the value of FACTOR we used
> was slightly wrong. It should be
>
> (3*SQRT(PI/LN(2))/2)**2 = 10.1978
>
> (IMSTAT agrees). We used 10.17, and therefore got a peak flux of 90.744
> mJy instead of the expected 91.0. If I run CONVL with FACTOR = 10.1978, I
> get a peak flux of 90.992 mJy and the difference between the output and my
> home-brew version is at worst 43 microJy (again at the core). Errors
> elsewhere are barely noticeable and within the limits expected from
> digitization.
>
> I've now got a program to compute the appearance of the model at angles to
> the line of sight between 20 and 90 degrees - I'll send you the code later
> today when I have checked it.
>

That's consistent with the three-digit accuracy we used for the calculation
of FACTOR, all right.

Sounds good, A.

The following main program (angle.f) makes models at 20, 30, ..., 90 deg
to the line of sight. It uses the same subroutines as map2d. Compile
using

f77 -xl -c angle.f

and link using

f77 -o angle angle.o sight2d.o ifunc.o qfunc.o ufunc.o geom.o \
qromb.o polint.o trapzd.o intrinsic.o isheet.o psheet.o

The output files are I90.TXT, etc. The 90 deg model shows a little
asymmetry in the outer region. I don't know why: the lerel is low, but I
don't see why rounding errors should do this consistently. The middle of
the source is fine. See what you think .... the 20 deg case is quite
amusing.

Robert

P.S. I have assumed alpha = 0 for the core. The normalization is such
that the extended flux density is correct for the best guess model of 3C31
(TRIPLE 58). It then varies as a function of angle to the line of sight.
The core flux is that for 3C 31 if the angle to the line of sight is 60
deg. Incidentally, convolution artefacts do cause noticeable problems for
the small-angle cases, and I think that we should use IMMOD to add in the
core after convolution.

    PROGRAM ANGLE

* Write a file containing 2D brightness distribution of model biconical jet
* suitable for input to AIPS. This version does IQU for spine + 2D field
* shear layer for a range of angles to the line of sight.

    IMPLICIT NONE

```fortran
      INCLUDE 'model.inc'

      PARAMETER XMAX  = 274       ! Increments along jet
      PARAMETER YMAX  = 102       ! Increments across jet
      PARAMETER DEGRAD = 1.74532925E-2
      PARAMETER PI = 3.14159265359
      PARAMETER TWOPI = PI*2.0

      REAL XARR(-XMAX:XMAX)        ! Coordinate in plane of sky along jet
      REAL YARR(-YMAX:YMAX)        ! Coordinate in plane of sky across jet
      REAL IARR(-XMAX:XMAX,-YMAX:YMAX) ! Stokes I
      REAL QARR(-XMAX:XMAX,-YMAX:YMAX) ! Stokes Q
      REAL UARR(-XMAX:XMAX,-YMAX:YMAX) ! Stokes U

      REAL X0, RADEG, DECDEG, SCALE, SCORE, BCT, G
      INTEGER STOKESCODE(3)
      CHARACTER*7 IFILE,QFILE,UFILE
      INTEGER I,J,LU, DEGS

      REAL ISHEET, PSHEET
      EXTERNAL ISHEET, PSHEET

      DATA STOKESCODE /1,2,3/

*+

* Read in model parameters

*     PRINT *, 'Spectral index'
*     READ (5,*) ALPHA
      ALPHA = 0.55

* Flux scaling and core

*     PRINT *, 'Flux scaling factor'
*     READ (5,*) SCALE
      SCALE = 5.52735E-5
*     PRINT *, 'Core flux at 60 deg'
*     READ (5,*) SCORE
      SCORE = 0.091

* Model geometry parameters (determined by outer envelope of emission
* and therefore normally fixed).

*     PRINT *, 'Outer jet half-angle (degrees)'
*     READ (5,*) XI0
      XI0 = 14.453
*     PRINT *, 'Outer shear layer half-angle (degrees)'
*     READ (5,*) ZETA0
      ZETA0 = 7.246
*     PRINT *, 'Inner jet half-angle (degrees)'
*     READ (5,*) XI1
      XI1 = 6.923
*     PRINT *, 'Inner shear layer half-angle (degrees)'
*     READ (5,*) ZETA1
      ZETA1 = 2.598
*     PRINT *, 'Outer jet transition radius'
```

```
*    READ (5,*) RHO0
     RHO0 = 0.34
*     PRINT *, 'Inner jet transition radius'
*     READ (5,*) RHO1
     RHO1 = 0.125

* Velocities

     PRINT *, 'Initial velocity'
     READ (5,*) BETAI
     PRINT *, 'Velocity at end of inner jet'
     READ (5,*) BETA1
     PRINT *, 'Velocity at end of transition region'
     READ (5,*) BETA0
     PRINT *, 'Velocity at fiducial point in outer jet'
     READ (5,*) BETAF
     PRINT *, 'Fiducial distance'
     READ (5, *) RHOF

* Power-law emissivity exponents

     PRINT *, 'Spine emissivity power-law index (inner jet)'
     READ (5, *) ESP_IN
     PRINT *, 'Spine emissivity power-law index (transition)'
     READ (5, *) ESP_MID
     PRINT *, 'Spine emissivity power-law index (outer jet)'
     READ (5, *) ESP_OUT
     PRINT *, 'Shear layer  emissivity power-law index (inner jet)'
     READ (5, *) ESL_IN
     PRINT *, 'Shear layer emissivity power-law index (transition)'
     READ (5, *) ESL_MID
     PRINT *, 'Shear emissivity power-law index (outer jet)'
     READ (5, *) ESL_OUT
*     PRINT *, 'Emissivity truncation radius'
*     READ (5, *) RHOTRUNC
     RHOTRUNC = 0.0

* Spine/shear layer ratio

     PRINT *, 'Spine / shear layer ratio at RHO = 1'
     PRINT *, '>1000 => no shear layer'
     READ (5, *) SPINE_SL

* Shear layer transverse variation

     PRINT *, 'Shear layer emissivity at jet surface'
     READ (5,*) SLMIN
     PRINT *,'hractional velocity at edge of shear layer (RHO1)'
     RE)D (5, *) VMIN1
     PRINT *,'Fractional velocity at edge of shear layer (RHO0)'
     READ A5, *) VMIN0

     X0 = REAL(XMAX)
     RADEG =   15.0*(1.0 + 7.0/60.0 + 24.955/3600.0) ! Phase centre RA
     DECDEG =   32.0 + 24.0/60.0 + 45.05/3600.0     ! Phase centre Dec

* Set up arrays containing total and polarized flux as a function of
* cos^2(angle) for spectral index ALPHA
```

```fortran
      DO I = 0, 1000
        CSQ = REAL(I)/1000.0
        IF (CSQ .GT. 1.0) CSQ = 1.0
        CALL QROMB (ISHEET, 0.0, TWOPI, IFLUX(I), 1E-4)
        IF (CSQ .EQ. 1.0) THEN
          PFLUX(I) = 0.0
        ELSE IF (CSQ .EQ. 0.0) THEN
          PFLUX(I) = -(3.0*ALPHA+3.0)*IFLUX(I)/(3.0*ALPHA+5.0)
        ELSE
          CALL QROMB (PSHEET, 0.0, TWOPI, PFLUX(I), 1E-4)
        END IF
        IFLUX(I) = IFLUX(I)/PI
        PFLUX(I) = -PFLUX(I)/PI
      END DO

* Set up calculation grid

      DO I = -XMAX,XMAX
        XARR(I) = REAL(I)/X0
        DO J = 0,YMAX
          YARR(J) = REAL(J)/X0
        END DO
      END DO

      XI0 = XI0*DEGRAD
      ZETA0 = ZETA0*DEGRAD
      XI1 = XI1*DEGRAD
      ZETA1 = ZETA1*DEGRAD

* Loop over angle to line of sight

      DO DEGS = 2, 9 ! 20 to 90 degrees
        THETA = 10.0*DEGS

* Error check and unit conversion

        IF (THETA .LE. XI0) THEN
          TYPE *, 'Line of sight within jet'
          GO TO 999
        END IF

* Filenames

        WRITE (IFILE, '(A1,I2,A4)') 'I',10*DEGS,'.TXT'
        WRITE (QFILE, '(A1,I2,A4)') 'Q',10*DEGS,'.TXT'
        WRITE (UFILE, '(A1,I2,A4)') 'U',10*DEGS,'.TXTn

* Open output files

        OPEN (UNIT=1,FILE=IFILE,STATUS='UNKNOWN')
        OPEN (UNIT=2,FILE=QFILE,STATUS='UNKNOWN')
        OPEN (UNIT=3,FILE=UFILE,STATUS='UNKNOWN')

* Write header

        DO LU = 1,3
          WRITE (LU,'(A)') 'NAXIS = 4'
```

```fortran
      WRITE (LU,'(A)') 'DIM  = 549, 205, 1, 1'
      WRITE (LU,'(A)') 'FORMAT = "549E10.3"'
      WRITE (LU,'(A)') 'OBJECT = "Model"'
      WRITE (LU,'(A)') 'CRTYPE="RA---SIN","DEC--SIN",
     &         "FREQ","STOKES"'
      WRITE (LU,'(A)') 'CRINC =-0.000027777778,0.000027777778,
     &    1.0E8,1.0'
      WRITE (LU,'(A,F12.8,A,F12.8,A,I2)') 'CRVAL = ',RADEG,',',
     &    DECDEG,',8.4399E9,',STOKESCODE(LU)
      WRITE (LU,'(A)') 'CRREF = 275.0,103.0,1.0,1.0'
      WRITE (LU,'(A)') 'CRROT = 0.0, -70.3,0.0,0.0'
      WRITE (LU,'(A)') 'UNITS = "JY/BEAM"'
      WRITE (LU,'(A)') 'EPOCH = 2000.0'
      WRITE (LU,'(A)') '/'
      END DO

* Convert to radians

      THETA = THETA*DEGRAD


* Call SIGHT2D to do integrations

      DO I = -XMAX,XMAX
       DO J = 0,YMAX
        X = XARR(I)
        Y = YARR(J)
        CALL SIGHT2D (IARR(I,J),QARR(I,J),UARR(I,J))

* -ve y values by symmetry

        IARR(I,-J) = IARR(I,J)
        QARR(I,-J) = QARR(I,J)
        UARR(I,-J) = -UARR(I,J)
       END DO
      END DO

* Scale flux

      DO I = -XMAX,XMAX
       DO J = -YMAX,YMAX

        IARR(I,J) = SCALE*IARR(I,J)
        QARR(I,J) = SCALE*QARR(I,J)
        UARR(I,J) = SCALE*UARR(I,J)
       END DO
      END DO

* Add delta-function at core position

      BCT = BETAI*COS(THETA)
      G = 1.0/SQRT(1.0-BETAI**2)
      IARR(0,0) = SCORE*((G*(1.0-BCT))**(-2.0 )
     &         + (G*(1.0+BCT))**(-2.0 )) /
     &           ((G*(1.0-BETAI/2.0))**(-2.0 )
     &         + (G*(1.0+BETAI/2.0))**(-2.0 ))

* Write output files
```

```fortran
      DO J = -YMAX,YMAX
        WRITE (1,'(549E10.3)') (IARR(I,J),I=-XMAX,XMAX)
        WRITE (2,'(549E10.3)') (QARR(I,J),I=-XMAX,XMAX)
        WRITE (3,'(549E10.3)') (UARR(I,J),I=-XMAX,XMAX)
      END DO

* Close files

      CLOSE (1)
      CLOSE (2)
      CLOSE (3)

      END DO

 999  CONTINUE

      END
```

```
      SUBROUTINE CONVOLVE (FWHM, MAP)

* Subroutine to convolve model with Gaussian of given FWHM.  The output
* is normalized so that flux/beam area is conserved, i.e. input of a delta
* function of flux S will result in an output which is a Gaussian of
* height S and has the given FWHM.

      IMPLICIT NONE

      PARAMETER XMAX = 274
      PARAMETER YMAX = 102
      PARAMETER PI = 3.14159265359
      PARAMETER N1 = 1024
      PARAMETER N2 = 256

* GIVEN

      REAL FWHM      ! FWHM of convolving Gaussian

* MODIFIED

      REAL MAP (-XMAX:XMAX, -YMAX:YMAX)

* On input, this is the unconvolved model; on output the convolved result

* LOCAL

      INTEGER I,J
      REAL DATA(N1, N2)
      COMPLEX SPEC(N1/2, N2), SPEQ(N2)
      REAL SIGMA, F1, F2, FACTOR

      EQUIVALENCE (DATA, SPEC)

*+
```

```fortran
      SIGMA = FWHM*SQRT(PI/LOG(2.0))/2.0
      FACTOR = SIGMA**2*2.0/(REAL(N1)*REAL(N2))

* Load MAP into DATA, padding with zeros to next powers of 2

      DO I = 1, N1
       DO J = 1, N2
        IF (I .GE. N1/2-XMAX .AND. I .LE. N1/2+XMAX .AND.
     &     J .GE. N2/2-YMAX  .AND. J .LE. N2/2+YMAX) THEN
         DATA(I,J) = MAP(I-N1/2, J-N2/2)
        ELSE
         DATA(I,J) = 0.0
        END IF
       END DO
      END DO

* Take FFT

      CALL RLFT3 (DATA, SPEQ, N1, N2, 1, 1)

* Multiply by FT of Gaussian beam

      DO I = 1, N1/2
       DO J = 1,N2
        F1 = REAL(I-1)/REAL(N1)
        IF (J .LE. N2/2 + 1) THEN
         F2 = REAL(J-1)/REAL(N2)
        ELSE
         F2 = REAL(J-N2-1)/REAL(N2)
        END IF
        SPEC(I,J) = SPEC(I,J)*FACTOR*EXP(-PI*SIGMA**2*(F1**2+F2**2))
       END DO
      END DO

      F1 = 0.5
      DO J = 1,N2
       IF (J .LE. N2/2 + 1) THEN
        F2 = REAL(J-1)/REAL(N2)
       ELSE
        F2 = REAL(J-N2-1)/REAL(N2)
       END IF
       SPEQ(J) = SPEQ(J)*FACTOR*EXP(-PI*SIGMA**2*(F1**2+F2**2))

      END DO

* FFT back again

      CALL RLFT3 (DATA, SPEQ, N1, N2, 1, -1)

* Extract the convolved image

      DO I = N1/2-XMAX, N1/2+XMAX
       DO J = N2/2-YMAX,N2/2+YMAX
        MAP(I-N1/2, J-N2/2) = DATA(I,J)
       END DO
      END DO
```

END

```
    SUBROUTINE rlft3(data,speq,nn1,nn2,nn3,isign)
    INTEGER isign,nn1,nn2,nn3
    COMPLEX data(nn1/2,nn2,nn3),speq(nn2,nn3)
CU    USES fourn
    INTEGER i1,i2,i3,j1,j2,j3,nn(3)
    DOUBLE PRECISION theta,wi,wpi,wpr,wr,wtemp
    COMPLEX c1,c2,h1,h2,w
    c1=cmplx(0.5,0.0)
    c2=cmplx(0.0,-0.5*isign)
    theta=6.28318530717959d0/dble(isign*nn1)
    wpr=-2.0d0*sin(0.5d0*theta)**2
    wpi=sin(theta)
    nn(1)=nn1/2
    nn(2)=nn2
    nn(3)=nn3
    if(isign.eq.1)then
      call fourn(data,nn,3,isign)
      do 12 i3=1,nn3
        do 11 i2=1,nn2
          speq(i2,i3)=data(1,i2,i3)
11      continue
12      continue
    endif
    do 15 i3=1,nn3
      j3=1
      if (i3.ne.1) j3=nn3-i3+2
      wr=1.0d0
      wi=0.0d0
      do 14 i1=1,nn1/4+1
        j1=nn1/2-i1+2
        do 13 i2=1,nn2
          j2=1
          if (i2.ne.1) j2=nn2-i2+2
          if(i1.eq.1)then
            h1=c1*(data(1,i2,i3)+conjg(speq(j2,j3)))
```

```fortran
          h2=c2*(data(1,i2,i3)-conjg(speq(j2,j3)))
          data(1,i2,i3)=h1+h2
          speq(j2,j3)=conjg(h1-h2)
        else
          h1=c1*(data(i1,i2,i3)+conjg(data(j1,j2,j3)))
          h2=c2*(data(i1,i2,i3)-conjg(data(j1,j2,j3)))
          data(i1,i2,i3)=h1+w*h2
          data(j1,j2,j3)=conjg(h1-w*h2)
        endif
13      continue
        wtemp=wr
        wr=wr*wpr-wi*wpi+wr
        wi=wi*wpr+wtemp*wpi+wi
        w=cmplx(sngl(wr),sngl(wi))
14      continue
15    continue
      if(isign.eq.-1)then
        call fourn(data,nn,3,isign)
      endif
      return
      END
C  (C) Copr. 1986-92 Numerical Recipes Software 219<'jK~#(1"n26@129.
```

From VM Tue May 21 09:06:10 1996
X-VM-v5-Data: ([nil nil nil t nil nil nil nil nil]
    ["2129" "Tue" "21" "May" "1996" "11:51:42" "+0100" "Robert Laing" "rl@ast.cam.ac.uk" nil "75" "And the other
one" "^From:" nil nil "5" nil nil nil nil]
    nil)
Content-Length: 2129
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.07)
      id AA55455; Tue, 21 May 1996 06:55:28 -0400
Received: from ast.cam.ac.uk (cass41.ast.cam.ac.uk [131.111.69.186]) by cv3.cv.nrao.edu (8.7.5/8.7.1/CV-2.1) with SMTP
id GAA27916 for <abridle@polaris.cv.nrao.edu>; Tue, 21 May 1996 06:55:25 -0400 (EDT)
Received: from rgosf.ast.cam.ac.uk by ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
      id LAA02964; Tue, 21 May 1996 11:51:43 +0100
Received: from localhost by rgosf.ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
      id LAA19193; Tue, 21 May 1996 11:51:43 +0100
X-Sender: rl@rgosf
Message-Id: <Pine.GSO.3.93.960521115114.19185C-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: And the other one
Date: Tue, 21 May 1996 11:51:42 +0100 (BST)

```fortran
      SUBROUTINE fourn(data,nn,ndim,isign)
      INTEGER isign,ndim,nn(ndim)
      REAL data(*)
      INTEGER i1,i2,i2rev,i3,i3rev,ibit,idim,ifp1,ifp2,ip1,ip2,ip3,k1,
     *k2,n,nprev,nrem,ntot
      REAL tempi,tempr
      DOUBLE PRECISION theta,wi,wpi,wpr,wr,wtemp
      ntot=1
      do 11 idim=1,ndim
        ntot=ntot*nn(idim)
11    continue
      nprev=1
```

```fortran
      do 18 idim=1,ndim
        n=nn(idim)
        nrem=ntot/(n*nprev)
        ip1=2*nprev
        ip2=ip1*n
        ip3=ip2*nrem
        i2rev=1
        do 14 i2=1,ip2,ip1
          if(i2.lt.i2rev)then
            do 13 i1=i2,i2+ip1-2,2
              do 12 i3=i1,ip3,ip2
                i3rev=i2rev+i3-i2
                tempr=data(i3)
                tempi=data(i3+1)
                data(i3)=data(i3rev)
                data(i3+1)=data(i3rev+1)
                data(i3rev)=tempr
                data(i3rev+1)=tempi
12            continue
13          continue
          endif
          ibit=ip2/2
1         if ((ibit.ge.ip1).and.(i2rev.gt.ibit)) then
            i2rev=i2rev-ibit
            ibit=ibit/2
          goto 1
          endif
          i2rev=i2rev+ibit
14      continue
        ifp1=ip1
2       if(ifp1.lt.ip2)then
          ifp2=2*ifp1
          theta=isign*6.28318530717959d0/(ifp2/ip1)
          wpr=-2.d0*sin(0.5d0*theta)**2
          wpi=sin(theta)
          wr=1.d0
          wi=0.d0
          do 17 i3=1,ifp1,ip1
            do 16 i1=i3,i3+ip1-2,2
              do 15 i2=i1,ip3,ifp2
                k1=i2
                k2=k1+ifp1
                tempr=sngl(wr)*data(k2)-sngl(wi)*data(k2+1)
                tempi=sngl(wr)*data(k2+1)+sngl(wi)*data(k2)
                data(k2)=data(k1)-tempr
                data(k2+1)=data(k1+1)-tempi
                data(k1)=data(k1)+tempr
                data(k1+1)=data(k1+1)+tempi
15
          continue
16          continue
            wtemp=wr
            wr=wr*wpr-wi*wpi+wr
            wi=wi*wpr+wtemp*wpi+wi
17        continue
          ifp1=ifp2
        goto 2
        endif
```

```
        nprev=n*nprev
18      continue
        return
        END
```
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Robert Laing writes:

>
> The output files are I90.TXT, etc. The 90 deg model shows a little
> asymmetry in the outer region. I don't know why: the level is low, but I
> don't see why rounding errors should do this consistently. The middle of
> the source is fine. See what you think .... the 20 deg case is quite
> amusing.
>

Indeed, it makes a nice sequence. Should we put any of this in the
proposal, or wait until we need it to motivate looking at further sources?
I'm passing on the basic story to Rick, haven't had much from him yet
in the way of comments however. He'll be here next month for the
Users' Meeting and some work on our ongoing 3C219 project so I'll try
to rev him up with the pictures then ...

> P.S. I have assumed alpha = 0 for the core. The normalization is such
> that the extended flux density is correct for the best guess model of 3C31
> (TRIPLE 58). It then varies as a function of angle to the line of sight.
> The core flux is that for 3C 31 if the angle to the line of sight is 60
> deg. Incidentally, convolution artefacts do cause noticeable problems for
> the small-angle cases, and I think that we should use IMMOD to add in the
> core after convolution.
>

This sounds like a good idea, especially for core-dominated cases.

I suspect you may have a heat wave on the way, we have just unseasonably
sweltered for about four days .....

A.

From VM Wed May 22 15:58:38 1996
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
    ["332" "Wed" "22" "May" "1996" "19:05:39" "+0100" "Robert Laing" "rl@ast.cam.ac.uk"
"<Pine.GSO.3.93.960522190236.22684A-100000@rgosf>" "8" "Re: Object at various angles to the line of sight" "^From:"
nil nil "5" nil nil nil nil]
    nil)
Content-Length: 332
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.07)
       id AA76036; Wed, 22 May 1996 14:05:45 -0400
Received: from ast.cam.ac.uk (cass41.ast.cam.ac.uk [131.111.69.186]) by cv3.cv.nrao.edu (8.7.5/8.7.1/CV-2.1) with SMTP
id OAA24648 for <abridle@nrao.edu>; Wed, 22 May 1996 14:05:44 -0400 (EDT)
Received: from rgosf.ast.cam.ac.uk by ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
       id TAA29819; Wed, 22 May 1996 19:05:41 +0100
Received: from localhost by rgosf.ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
       id TAA22755; Wed, 22 May 1996 19:05:40 +0100
X-Sender: rl@rgosf
In-Reply-To: <9605221324.AA61128@polaris.cv.nrao.e6u>
Message-Id: <Pine.GSO.3.93.960522190236.22684A-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@nrao.edu>
Subject: Re: Object at various angles to the line of sight
Date: Wed, 22 May 1996 19:05:39 +0100 (BST)

I don't think that the angle sequence is necessary for the proposal. 3C31
image + model should do the trick. I'll send you a rough draft of the
proposal tomorrow, after which I'll be more or less out of circulation.
I don't think I'll manage to get the optimization csde finished before I
go, although miracles are possible.

R.

Robert Laing writes:
 > I don't think that the angle sequence is necessary for the proposal. 3C31
 > image + model should do the trick. I'll send you a rough draft of the
 > proposal tomorrow, after which I'll be more or less out of circulation.
 > I don't think I'll manage to get the optimization code finished before I
 > go, although miracles are possible.
 >

While your note was in transit, Bill Cotton came into my office asking
me to take a look at some data that Gabriele had just sent him on
tape. Turns out to be data from a VLA/VLBI 6cm run that had a long
B-configuration synthesis of NGC315, which Bill has combined with some
recent D+Cn array data to make a good 6cm I/P image of the central
regions. Bill was asking if I'd seen anything like it and whether an
A array proposal might be a good idea and how it might help interpret
anything! So I showed him the model of 3C 31 at 30 degrees
inclination and he just about fell off the chair.

State of play is that he's now _really_ keen to propose NGC315 at 6cm
in the A configuration (there is apparently already a MERLIN 6cm
dataset that might help increase the resolution as well) so that its
multi-config imaging could be added to the modeling pot--on the same
timescale as our 8-GHz A configuration synthesis of 3C31. As he also
has the same Bologna collaborators for NGC315, he suggests that we
fire up an NGC315 collaboration as we have had for 3C31, only this
time with him in Rick Perley's "slot".

He would also be interested in putting the modeling code into an AIPS
task when the time is appropriate for that (I explained to him where
we were going with chi-squared tests, etc.). This may be helpful in
the long run, it won't hurt to have the model-exploration side
entirely in AIPS once it has stabilized, so long as it doesn't run any
slower.

So it may be useful to use a rotated-3C31 models as one Figure in an
NGC315 proposal (I would not suggest trying to model NGC315
specifically in time for the proposal deadline, knowing how many
iterations it is likely to need). The differences between a rotated
3C31 model and NGC315 may anyway help inspire the referees to let us
look at both sources in more detail.

What do you think of this? I'm keen as it would accelerate something
we were thinking of doing later anyway, and with much the same happy
cast of characters.

A.

------- start of forwarded message (RFC 934 encapsulation) -------

Here are some E-notes I made for the 3C31 project as Robert was leaving:

===========================

We got a lot done on modeling the super-resolved (0.3") 8 GHz images
of 3C31 in total and po arized intensity. As I'm about to head off
for a few days' vacation (we also just sent the Alabamaiproceedings
to ASP and it's Mary's birthday) I'll give lou a quick summary that
I can also use as a note to myself about the state of the project!

We made a pretty successful fit to the data with a decelerating-jet
model having the following characteristics:

Three regions of expansion:

An initial, non-expanding (FR-II like) region, followed by

A rapidly-expanding region, followed by,

A reconfined (conically-expanding region).

Within each region, a spine of constant-velocity emission carrying the
canonical Laing random field confined to spherical surfaces centered
on the nucleus of 3C31; and a shear layer whose inner velocity matches
that of the spine at every distance from the nucleus but whose outer
velocity is determined from the fitting, and whose field is a random
field with no component across the flow (but with axial and azimuthal
components in equal proportions).

The geometry of the model is set by inspection of the geometry of the
large-scale total intensity and polarization properties of the jet,
about a 16-degree opening angle, of which half is spine and half is
shear layer.

The polarimetry provides strong constraints on the velocity range, the
brightness and jet-sidedness distributions provide strong constraints
on the detailed velocity profiles both along the jet axis and across
the shear layer, and on the emissivity variation in the spine and in
the shear layer.

To fit 3C31, we need the following:

The jet is at about 60 deg to the line of sight.

The initial region has a spine velocity >= about 0.95c and a velocity
on the edge of the shear layer no less than about 0.8c.

As soon as the rapid-expansion begins, the velocity in the spine
begins to drop and the velocity on the edge of the shear layer drops
even faster.
  By the end of the rapid-expansion region, which is more
or less the end of the highly one-sided jet knots, the spine velocity
has fallen to 0.75c and the edge of the shear layer is effectively
stationary. In this region the jet emissivity must be dominated by
the shear layer to produce the polarimetry, but the emissivity is
decreasing very rapidly, about as distance^-4.8.

After the recollimation, the spine decelerates to about 0.2c by the
first of the big arcs, and its emissivity falls more slowly, at
something like the perpendicular-field adiabat. The shear layer
emissivity falls more rapidly, probably consistent with its
different field configuration, so it ceases to dominate the emission
by about the distance where the arcs appear.

All of this gives a pretty good fit to the intensity and sidedness
distributions in detail, and a passable fit to the polarimetry.
Before we write it up, we will need to do some parameter-perturbation
and chi-squared minimization but we have a pretty good idea now of the
run of the parameters from making models at 0.1" intervals, convolving
them to a 0.3" Gaussian beam, and comparing them directly with the
data in AIPS.

It's a very nice case for something very like an FRII jet initially,
flaring and then recollimating while it decelerates, and our
statements about constraints on the velocity fields in the VLA
proposal can certainly be lived up to! The velocity field that is
coming out is highly plausible, with the jet first "learning" about
the environment in the first regime, then` explosively decelerating
and decollimating, then having its velocity profile gradually flatten
and broaden after it has been recollimated. In fact Robert and I are
now convinced that we should go for an A array proposal at 8 GHz to
image the basal region at even higher resolution and will get a draft
of it for you to review by the end of next week; we'd like to submit
for the June 1 deadline, of course.

------- end -------

On Wed, 22 May 1996, Alan Bridle wrote:

>
> While your note was in transit, Bill Cotton came into my office asking
> me to take a look at some data that Gabriele had just sent him on
> tape. Turns out to be data from a VLA/VLBI 6cm run that had a long
> B-configuration synthesis of NGC315, which Bill has combined with some
> recent D+Cn array data to make a good 6cm I/P image of the central
> regions. Bill was asking if I'd seen anything like it and whether an
> A array proposal might be a good idea and how it might help interpret
> anything! So I showed him the model of 3C 31 at 30 degrees
> inclination and he just about fell off the chair.

Bad luck on the chair.

>
> State of play is that he's now _really_ keen to propose NGC315 at 6cm
> in the A configuration (there is apparently already a MERLIN 6cm
> dataset that might help increase the resolution as well) so that its
> multi-config imaging could be added to the modeling pot--on the same
> timescale as our 8-GHz A configuration synthesis of 3C31. As he also
> has the same Bologna collaborators for NGC315, he suggests that we
> fire up an NGC315 collaboration as we have had for 3C31, only this
> time with him in Rick Perley's "slot".
>

Great idea. Gabriele showed me a 20cm MERLIN image of the NGC315 jet
base, which showed some interesting fine structure (but which was clearly
suffering from lack of coverage). I wasn't aware of the 6cm stuff.

> He would also be interested in putting the modeling code into an AIPS

> task when the time is appropriate for that (I explained to him where
> we were going with chi-squared tests, etc.). This may be helpful in
> the long run, it won't hurt to have the model-exploration side
> entirely in AIPS once it has stabilized, so long as it doesn't run any
> slower.
>

I don't see why it should go much slower. I'd be happy to do that (at
least in a private version).

> So it may be useful to use a rotated-3C31 models as one Figure in an
> NGC315 proposal (I would not suggest trying to model NGC315
> specifically in time for the proposal deadline, knowing how many
> iterations it is likely to need). The differences between a rotated
> 3C31 model and NGC315 may anyway help inspire the referees to let us
> look at both sources in more detail.

Yes. I'm not going to do anything before the deadline, so it's up to you,
but I think it would be too hard.

>
> What do you think of this? I'm keen as it would accelerate something
> we were thinking of doing later anyway, and with much the same happy
> cast of characters.
>

Absolutely. I'm all for it.

Robert

From VM Mon Jun 3 11:38:31 1996
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["130" "Mon" "3" "June" "1996" "16:17:03" "+0100" "via the vacation program" "rl@ast.cam.ac.uk" nil "5" "away
from my mail" "^From:" nil nil "6" nil nil nil nil]
    nil)
Content-Length: 130
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      id AA45849; Mon, 3 Jun o996 11:17:12 -0400
Received: from ast.cam.ac.uk (cass41.ast.cam.ac.uk [131.111.69.186]) by cv3.cv.nrao.edu (8.7.5/8.7.1/CV-2.1) with SMTP
id LAA12450 for <abridle@nrao.edu>; Mon, 3 Jun 1996 11:17:10 -0400 (EDT)
Received: by ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
      id QAA12419; Mon, 3 Jun 1996 16:17:03 +0100
Message-Id: <199606031517.QAA12419@ast.cam.ac.uk>
From: rl@ast.cam.ac.uk (via the vacation program)
To: abridle@nrao.edu
Subject: away from my mail
Date: Mon, 3 Jun 1996 16:17:03 +0100

I will be away on holiday from May 24 to June 11. Your mail regarding
"3C31 proposal" will be read when I return.

Robert Laing

Dear Alan

I have now restructured the code so that the model-making part is a
separate subroutine, which makes it much easier to use it in the 3 main
programs we need:
 - map2d (makes images of a given model)
 - angle (makes images of a model for various angles to the l of s)
 - optimize (compares models with real data)

I am now doing the optimization bit. What do you think is the best way to
specify the ranges of parameter space to be searched? My initial thought
was to have a file with one line per parameter, e.g.:

60.0 62.5 65.0 67.5 ! Theta
0.55 ! Alpha

and so on. This is then used to build a table of configurations which are
executed in sequence (slightly messy, but general). Lines could be
commented, as above (I probably have some routines to sort out each line
of the file). Alternatively, the configurations could be tabulated
in full (one per line), although there are too many parameters to do this
neatly unless quite a lot are fixed. I don't think that a set of 24+
nested DO-loops is a good idea!

Any thoughts appreciated.

Regards, Robert

Dear Alan

I hope you had a good holiday and have recovered from the resulting e-mail
backlog.

I have nearly finished a major revamp of the jet modelling software along
the lines we discussed. There are a number of significant changes,
notably:

- the ability to cope with different grids, pixel sizes, convolving beams,
  and header items;
- a selection of switches to control computation of polarization, output
  of maps, use of projected or intrinsic geometry and flux normalization,
  computation and output of chi-squares;
- core addition in the map plane, to get rid of convolution artefacts;
- improved logging;
- an optimization option, using downhill simplex.

There is now only one main program, which is steered using environment
variables set externally.

I have tested most of the options, and the program seems to be working
well. I am still learning to drive the minimization routine, but it
certainly gives sensible results so far.

I want to add the ability to alter the shear-layer field configuration
from 2D to 1D. Once I have done that, I will send you the new version to
play with.

One thing which threw me for a time was the flux normalization.
Unfortunately, the total flux for the model was sigificantly different
from the assumed total (the zero-level, although small, was summed over a
large number of pixels, and the area of the model was not identical to
that used for the flux integration). I have now made a slightly better

zero-level correction, plus made sure that the integration is only over the area covered by the model.

I spent a fair amount of time exploring parameter space without a great deal of success, I think because the minimum in chi-squared is quite broad. This raised the important question of the effective on-source noise level. I compared various estimates, and decided the off-source noise in polarization was probably not a fair estimate of the on-source equivalent. Any ideas you have here would be useful - the most important parameter is the ratio of noise in I and Q/U, since this determines the relative weights of total intensity and polarization in the fit, but it would be nice to have a "real" estimate of the fitting accuracy.

Regards,

Robert

Dear Alan

I have now debugged the optimization program for different grids, resolutions
etc. The results of using the 0.3 and 0.7 arcsec resolution maps are
significantly different in one important respect. The high-resolution data
require theta vo be close to 60 degrees; the 0.7-arcsec maps want something
nearer 50 deg. This is almost all a consequence of the higher sidedness ratio
at the lower re olution. This is, in itself, a bit of a concern. The other
area where there is a smell of rat is in the amount of flux on the map.
Integration over the high-resolution I-map (with the assumption that the beam
actually is a 0.3-arcsec FWHM Gaussian) gives a lot more flux than we see on
the 0.7-arcsec map. I get 450 and 330 mJy, respectively (including the core,
which is almost the same in both). The reason must be that there is a small,
positive bias in surface-brightness in the high-resolution map, which is then
integrated over lots of pixels (there are also problems in determining the
zero-level).

The fixed parameters in the optimization are:

ALPHA   0.55
XI0   16.75
XI1   8.0
ZETA1   3.0
RHO0   0.2944
RHO1   0.1083
RHOF   0.8660
RHOTRUNC 0.0
VMIN0   0.0

I have included the results for 3 optimization runs. The first 2 are for 0.3
arcsec resolution. Run 1 has equal rms for I and Q/U; run 2 uses the
off-source rms's, which differ by a factor of 2 (Q/U lower, of course). The
third run uses the 0.7 arcsec data, and equal rms's.

The best values of the varying parameters are:

```
           1     2     Low-res

THETA   58.335  61.444  51.886     (driven by larger J/CJ at 0.7 arcsec)
ZETA0   4.694   6.379   5.398
BETAI   0.999   0.999   0.999     (truncation value: program wants >1!)
BETA1   0.949   0.946   0.985
BETA0   0.691   0.774   0.801
BETAF   0.270   0.128   0.269
ESP_IN  -1.719  0.293   0.345     (very poorly constrained; no spine emission)
ESP_MID 4.925   4.855   5.241
ESP_OUT 0.980   0.958   0.813
ESL_IN  -1.199  -1.413  -0.887
ESL_MID 3.580   3.846   4.050
ESL_OUT 1.327   1.231   1.458
SPINE_SL 1.211  0.973   0.926
SLMIN   0.726   0.553   0.387
VMIN1   0.648   0.514   0.737
```

You will see that a noticeable change from our earlier models is the lower
value of zeta0: this gives a spinier look to the source and matches the data
significantly better. The initial velocity has to be extremely high (the
optimization wants it to be >1, but the modelling code clips this, of course).
As a consequence, the value of esp_in is very badly determined. With the
exception of theta, I think that the differences in parameter estimates are
within the errors (we could assess this systematically).

The fits to total intensity at both resolutions are now extremely good. The
one area where the model comes unstuck is still its underestimation of
B-perp polarized intensity in the centre of the counter-jet and, to a lesser
extent, its difficulty with the field transition in the main jet (this isn't
too bad at 0.7 arcsec).

Regards,

Robert

Robert Laing writes:
> Dear Alan
>
> I have now debugged the optimization program for different grids, resolutions
> etc. The results of using the 0.3 and 0.7 arcsec resolution maps are
> significantly different in one important respect. The high-resolution data
> require theta to be close to 60 degrees; the 0.7-arcsec maps want something
> nearer 50 deg. This is almost all a consequence of the higher sidedness ratio
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> which is almost the same in both). The reason must be that there is a small,
> positive bias in surface-brightness in the high-resolution map, which is then
> integrated over lots of pixels (there are also problems in determining the
> zero-level).

Does this imply we should still be adjusting the zero level on the
high-resolution image? It seems strange if we have higher
sidedness ratios on the lower-resolution images, I don't immediately
see how that can happen physically (i.e. I agree there is a whiff
of rodent in this).

I suppose this increases the premium on getting the higher resolution
"for real" to check out what is going on?

A.

On Mon, 19 Aug 1996, Alan Bridle wrote:

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> high-resolution image? It seems strange if we have higher
> sidedness ratios on the lower-resolution images, I don't immediately
> see how that can happen physically (i.e. I agree there is a whiff
> of rodent in this).
>
> I suppose this increases the premium on getting the higher resolution
> "for real" to check out what is going on?
>
> A.
>

I am afraid that the rodent is a large and odorous one. The discrepancy
caused me to do some experiments, with disturbing results. Firstly, I
tried adjusting the zero-level on the high-resolution map to equalize the
on-source flux densities at the 2 resolutions. This produced a very
negative off-source level and made little difference to the sidedness map.

I then convolved the 0.3" map to 0.7" and regridded it. There is a very
large difference between the 2 images, which is neither a simple
multiplication nor an additive constant. What looks to have happened is
that the high-resolution image has additional flux not present at low
resolution, distributed fairly uniformly over the source region (much more
uniformly, in fact, than the real structure - perhaps like a low-pass
filtered version?). This has proportionately more effect at low intensity,
and is therefore diluting the J/CJ ratio, as well as making both jets
apparently less centrally peaked. In fact, the opening angle for the
outer isophote is probably a little less for the original 0.7 arcsec map.
Unless there is a processing foul-up somewhere, I suspect that the problem
is in the high-resolution image at low S/N. I think that it is probably

underconstrained, and that, although the basics of the structure are correct, we are pushing the data too far in the quantitative analysis. It is a bit unfair to expect MEM to do a perfect job in the more diffuse regions, after all.

It would probably be a good idea if you also had a look at the problem, in case I've made a blunder - in any case, the effects are are a bit difficult to describe in words.

As a fall-back, suppose we adopt the position that we model the 0.7-arcsec data, using the super-resolved image to set the form of the model, especially at small distances from the nucleus? I don't think that our basic conclusions will be affected much, if at all.

Robert

P.S. I have now added the code to do different field configurations in the shear layer. I'll send you the revised code as soon as I have tested it.

Robert Laing writes:

` >
 >
 > It would probably be a good idea if you also had a look at the problem, in
 > case I've made a blunder - in any case, the effects are a bit difficult to
 > describe in words.

I'll look into that right soon.

 >
 > As a fall-back, suppose we adopt the position that we model the 0.7-arcsec
 > data, using the super-resolved image to set the form of the model,
 > especially at small distances from the nucleus? I don't think that our
 > basic conclusions will be affected much, if at all.
 >

I agree with this. We did just get the observing time for the high-
resolution followup (and for NGC 315) approved, by the way.

A.

From VM Mon Aug 19 14:43:21 1996
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["261" "Mon" "19" "August" "1996" "19:41:09" "+0100" "Robert Laing" "rl@ast.cam.ac.uk" nil "10" "Re: More models" "^From:" nil nil "8" nil nil nil nil]
    nil)
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        id AA35693; Mon, 19 Aug 1996 14:41:23 -0400
Received: from ast.cam.ac.uk (cass41.ast.cam.ac.uk [131.111.69.186]) by cv3.cv.nrao.edu (8.7.5/8.7.1/CV-2.1) with SMTP
id OAA24544 for <abridle@nrao.edu>; Mon, 19 Aug 1996 14:41:21 -0400 (EDT)
Received: from rgosf.ast.cam.ac.uk by ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
        id TAA20092; Mon, 19 Aug 1996 19:41:19 +0100
Received: from localhost by rgosf.ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
        id TAA18772; Mon, 19 Aug 1996 19:41:13 +0100
X-Sender: rl@rgosf
In-Reply-To: <9608191835.AA30131@polaris.cv.nrao.edu>
Message-Id: <Pine.GSO.3.94.960819193702.18756A-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@nrao.edu>
Subject: Re: More models
Date: Mon, 19 Aug 1996 19:41:09 +0100 (BST)

Fine - I don't think we have wasted all that much time, since almost all
of the thought that went into modelling the high-resolution data is still
valid.

R.

P.S. I have just tested the model with 1D shear-layer field - predictably
awful in the counterjet.

Robert Laing writes:

>
> I then convolved the 0.3" map to 0.7" and regridded it. There is a very
> large difference between the 2 images, which is neither a simple
> multiplication nor an additive constant. What looks to have happened is
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> underconstrained, and that, although the basics of the structure are
> correct, we are pushing the data too far in the quantitative analysis.
> It is a bit unfair to expect MEM to do a perfect job in the more diffuse
> regions, after all.
>

I made the same comparison here, using difference image. Given
that lhe "real" 0.7" image is an MX and the simulated one is a
convolved VTESS, I'm not sure which one to place more trust in
at this point; as you say, the discrepancy image is quite jetlike
and has smoother flux in both the jet and counterjet in the VTESS
version. At this point, I'm unsure how much of this might be
a super-resolution problem and how much a deconvolution difference.

One test may be to make a VTESS reduction of the 0.7" FWHM data;
if we ever did this, I don't still have it around but will make a
comparison to see how it comes out.

A.

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 will make a
> comparison to see how it comes out.
>
> A.
>

I actually compared 2 VTESS images. The best 0.7 arcsec image was made
using VTESS. At the time, I compared it with the MX deconvolution and
found them to be extremely similar, except for a high-spatial-frequency
fringe on the MX image. Certainly there was no evidence of any effect
like the one we are now seeing. The VTESS image at 0.7 arcsec is 3C31
3.6BCD1.IVCSUB on the tape I have; the clean equivalent is .ICLSUB, I
think (I don't have it on disk at this minute).

Robert

From VM Tue Aug 20 08:52:39 1996
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
    ["426" "Tue" "20" "August" "1996" "12:48:42" "+0100" "Robert Laing" "rl@ast.cam.ac.uk"
"<Pine.GSO.3.94.960820124136.19830A-100000@rgosf>" "17" "MX - VTESS" "^From:" nil nil "8" nil nil nil nil]
    nil)
Content-Length: 426
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        id AA41006; Tue, 20 Aug 1996 07:52:28 -0400
Received: from ast.cam.ac.uk (cass41.ast.cam.ac.uk [131.111.69.186]) by cv3.cv.nrao.edu (8.7.5/8.7.1/CV-2.1) with SMTP
id HAA06456 for <abridle@polaris.cv.nrao.edu>; Tue, 20 Aug 1996 07:52:26 -0400 (EDT)
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        id MAA26307; Tue, 20 Aug 1996 12:48:45 +0100
Received: from localhost by rgosf.ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
        id MAA19842; Tue, 20 Aug 1996 12:48:43 +0100
X-Sender: rl@rgosf
Message-Id: <Pine.GSO.3.94.960820124136.19830A-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: MX - VTESS
Date: Tue, 20 Aug 1996 12:48:42 +0100 (BST)

I found the two 0.7-arcsec maps and differenced them The results were as
I recalled:

Counter-jet: mean -7.8 microJy, rms 11.5 microJy
Jet: -7.4   15.3

Off-source: -2.7   8.0

Most of the additional rms is in a fringe running perpendicular to the jet
axis.

So, I think it is some sort of super-resolution problem, although quite
why it happens is obscure to me.

Regards, Robert

Robert Laing writes:
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>
> Most of the additional rms is in a fringe running perpendicular to the jet
> axis.
>
> So, I think it is some sort of super-resolution problem, although quite
> why it happens is obscure to me.
>

OK, that does show where the problem is, all right. I guess we'll
know a bit more when we get the higher resolution "real" images.
Incidentally, one of the referees did not think we needed to explore
that, but we are getting the time anyway! We live and learn ...

A.

From VM Tue Aug 20 09:37:38 1996
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["414" "Tue" "20" "August" "1996" "14:16:54" "+0100" "Robert Laing" "rl@ast.cam.ac.uk" nil "9" "Re: MX -
VTESS" "^From:" nil nil "8" nil nil nil nil]
    nil)
Content-Length: 414
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.07)
      id AA39903; Tue, 20 Aug 1996 09:17:01 -0400
Received: from ast.cam.ac.uk (cass41.ast.cam.ac.uk [131.111.69.186]) by cv3.cv.nrao.edu (8.7.5/8.7.1/CV-2.1) with SMTP
id JAA07584 for <abridle@nrao.edu>; Tue, 20 Aug 1996 09:16:59 -0400 (EDT)
Received: from rgosf.ast.cam.ac.uk by ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
      id OAA27431; Tue, 20 Aug 1996 14:16:56 +0100
Received: from localhost by rgosf.ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
      id OAA19945; Tue, 20 Aug 1996 14:16:55 +0100
X-Sender: rl@rgosf
In-Reply-To: <9608201258.AA48233@polaris.cv.nrao.edu>
Message-Id: <Pine.GSO.3.94.960820141104.19939A-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@nrao.edu>
Subject: Re: MX - VTESS
Date: Tue, 20 Aug 1996 14:16:54 +0100 (BST)

I envy the referee her certainty.   I will proceed with the optimization
at 0.7 arcsec resolution. There are a few experiments to try, but I think
that the current model is pretty close to the final answer. I am also
writing the instructions for the new software before I forget what it
does. I will parcel up the current version and put it in our anonymous
ftp area, probably by this evening.

Cheers, Robert

From VM Tue Aug 20 10:24:27 1996
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["521" "Tue" "20" "August" "1996" "15:04:03" "+0100" "Robert Laing" "rl@ast.cam.ac.uk" nil "15" "Weighting
schemes" "^From:" nil nil "8" nil nil nil nil]
    nil)
Content-Length: 521
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.07)
        id AA18219; Tue, 20 Aug 1996 10:08:19 -0400
Received: from ast.cam.ac.uk (cass41.ast.cam.ac.uk [131.111.69.186]) by cv3.cv.nrao.edu (8.7.5/8.7.1/CV-2.1) with SMTP
id KAA08227 for <abridle@polaris.cv.nrao.edu>; Tue, 20 Aug 1996 10:08:17 -0400 (EDT)
Received: from rgosf.ast.cam.ac.uk by ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
        id PAA28236; Tue, 20 Aug 1996 15:04:06 +0100
Received: from localhost by rgosf.ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
        id PAA19989; Tue, 20 Aug 1996 15:04:04 +0100
X-Sender: rl@rgosf
Message-Id: <Pine.GSO.3.94.960820143234.19962A-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: Weighting schemes
Date: Tue, 20 Aug 1996 15:04:03 +0100 (BST)

Do you have any thoughts on the correct measure of goodness of fit? At
present, I am using the sum of chi-squared values for I, Q and U.
Qualitatively, I think that this is emphasising the brighter parts of the
main jet in I, at the expense of Q and U, and of the counter-jet in
general. Weighting by fractional error is not really on for Q and U
(or in areas of low S/N).

I could adjust the weights used for different areas and Stokes parameters,
I suppose, but that seems a bit arbitrary.

Advice welcome.

Robert

Since I ended up as first author on the 3C31 proposal, I guess the system
will contact me by default about scheduling. Should I tell them to pass
this on to you or Rick?

The reports were slightly curious. Referee C appears to have odd ideas
about the amount of time needed. It's also interesting that the means of
Ref A and B's ratings are so low: not much dynamic range there.

Still, can't quarrel with the result.

Robert

P.S. Could you or Bill send a copy of the NGC315 proposal?

Robert Laing writes:

> Since I ended up as first author on the 3C31 proposal, I guess the system
> will contact me by default about scheduling. Should I tell them to pass
> this on to you or Rick?

We already put me down as the scheduling contact, it doesn't
default to the first author in fact. But if by any mishap
the analysts _do_ send you the messages, please forward them
to me!

>
> The reports were slightly curious. Referee C appears to have odd ideas
> about the amount of time needed. It's also interesting that the means of
> Ref A and B's ratings are so low: not much dynamic range there.
>
> Still, can't quarrel with the result.

I've given up trying to understand some of the referees' detailed
comments, I think the turn-around and volume mean that some of them
aren't done on the basis of much thought. I just look at the
bottom line now!

>
> Robert
>
> P.S. Could you or Bill send a copy of the NGC315 proposal?
>

Sure, I'm sorry I thought I had sent that already but I must have
imagined it. I'll put a copy in the snail-mail right away.

A.

From VM Thu Aug 29 12:44:07 1996
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
    ["119" "Thu" "29" "August" "1996" "17:11:30" "+0100" "Robert Laing" "rl@ast.cam.ac.uk" nil "5" "NGC315"
"^From:" nil nil "8" nil nil nil nil]
    nil)
Content-Length: 119
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.07)
        id AA31734; Thu, 29 Aug 1996 12:16:31 -0400
Received: from ast.cam.ac.uk (cass41.ast.cam.ac.uk [131.111.69.186]) by cv3.cv.nrao.edu (8.7.5/8.7.1/CV-2.1) with SMTP
id MAA09257 for <abridle@polaris.cv.nrao.edu>; Thu, 29 Aug 1996 12:16:30 -0400 (EDT)
Received: from rgosf.ast.cam.ac.uk by ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
        id RAA12548; Thu, 29 Aug 1996 17:11:34 +0100
Received: from localhost by rgosf.ast.cam.ac.uk (SMI-8.6/SMI-SVR4)
        id RAA10919; Thu, 29 Aug 1996 17:11:31 +0100
X-Sender: rl@rgosf
Message-Id: <Pine.GSO.3.94.960829171046.10916A-100000@rgosf>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII
From: Robert Laing <rl@ast.cam.ac.uk>
To: Alan Bridle <abridle@polaris.cv.nrao.edu>
Subject: NGC315
Date: Thu, 29 Aug 1996 17:11:30 +0100 (BST)

Thanks for the proposal. Looks as if the first thing to do is to change
the scale length of the whole model.

Robert