From root Thu Jan 14 11:53:20 1993
From: "Robert Laing, RGO, Cambridge" <RL@STARLINK.ASTRONOMY.CAMBRIDGE.AC.UK>
To: ABRIDLE <ABRIDLE@polaris.cv.nrao.edu>
Subject: 3C 31
Date: Thu, 14 Jan 93 16:51 GMT

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 Feb 4 12:17:18 1993
From: "Robert Laing, RGO, Cambridge" <"CAVAD::RL"@STARLINK.ASTRONOMY.CAMBRIDGE.A
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

From root Wed Feb 3 15:55:40 1993
From: "Robert Laing, RGO, Cambridge" <"CAVAD::RL"@STARLINK.ASTRONOMY.CAMBRIDGE.A
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: gt0040a@prism.gatech.EDU (Tom Sorensen)
Subject: PKZip 2.04 C->E: quick list of fixes

PKZip 2.04e has now been released. The following is a brief consensus of what bugs have been fixed and which are still there. For a full listing of the 2.04c bugs, please go back in the conference and look for the posting.

(Note- this is *NOT* a complete list of bug fixes, but rather a listing of what was fixed that was on the buglist I maintained. For a full listing of bug fixes see the PKZ204E announcement or the file inside the ZIP).

PKZip 2.04C bugs:

PKCFG.EXE produces an incorrect CFG with COMPRESS=MAXIMAL.
Fixed.

Viewing middle disks of multi-disk archive results in spinning drive.
Not fixed.

Having ZIPFILE=latest in PKZIP.CFG and -& on the commandline causes PKZIP to come up with the help screen. -o- does not help.
Fixed.

Old -x (eXtract) command now gives a help screen.
Explained in 2.04e documentation.

! Lines regarding XMS in PKZIP.CFG are ignored. Only the command line switch -- works. Additionally EMS=disabled disables *BOTH* EMS and XMS.
Fixed.

Under Novell Netware Lite PKZIP does not erase temporary files.
Fixed.

Various EMS & DPMI problems.
Fixed.

Another manual error: the -o switch sets the ZIP date to the LATEST file, not the oldest. Online help states it correctly.
Explained.

ZIP files have 0-byte files for directories.
Explained.

Norton Anti-virus generates a false positive.
Fixed.

The AV (Authenticity Verification) has been compromised.
Not fixed. (Note- due to the manner in which it was compromised this may not be fixable.)

Several users have reported their FAT being trashed after using PKZip.
Fixed- DPMI problem.

Using -&f can cause problems.
Almost fixed (original problem fixed, new ones popped up).

The multi-disk spanning ability of PKZip is highly unreliable.

Almost fixed.

PKZip may report CRC errors.
Fixed (DPMI problem)

The manual is both incorrect and confusing in places.
Fixed (by allowing both methods in CFG file)

Complaints.

PKZIP can't create 1.10 extratable, compressed archives.
Not changed.

PKZIP and PKUNZIP handle command-line parameters differently.
Not changed.

PKZIP and PKUNZIP currently have completely separate methods of configuration.
Not changed.

The multi-disk spanning function is feature poor.
Not changed.

The -m switch removes subdirectories.
-m- command was introduced to prevent this.

PKZip 2.04 doesn't report older AVs.
Not changed.

==========

Tom Sorensen

--

Tom Sorensen gt0040a@prism.gatech.edu
"I believe OS/2 is destined to be the most important operating system, and possibly program, of all time." - Bill Gates, November, 1987

From: gt0040a@prism.gatech.EDU (Tom Sorensen)
Subject: PKZip 2.04E bug list, #1

As with 2.04C, I am keeping a listing of the known PKZip 2.04E bugs and posting them as I find out about them. In order to keep things simple all information is posted at one time- both old and new info is in this file. As new bugs come up they'll be added to the beginning of the file. I've also created a list of common complaints by users. Bugs and complaints remaining from the 2.04c list are kept.

This is revision 1. New info is marked by a *. Changed info is marked by a !.

PKZip 2.04E bugs:

* The quick format function of -&fl will oftentimes NOT wipe all existing files. It will often leave unallocated file chains resulting in PKZIP -& using MORE diskettes than necessary. However, the only bad aspect is the excess usage. No data problems have been detected.

* If you use -&f and accidentally hit the keyboard at the end of a diskette, PKZIP will wipe your work and not warn you.

When viewing multiple disk archives you must do the view on the LAST disk. Viewing the first disk results in a prompt for the last disk. Viewing "middle" disks results in a perpetually spinning disk drive.

The AV (Authenticity Verification) was compromised a few hours after release. I HAVE confirmed this- I have exchanged several e-mail messages on the Internet with the person who broke the AV. I will not divulge the method (since he doesn't want it public knowledge, and I assume PKWare doesn't either) but it only affects pre-AV'd files and does NOT generate new AVs. Still, this means that a supposably secure ZIP file really has no protection- files inside the ZIP may be modified and still leave the AV intact. As of Monday, 1/18/93 at aprox. 2:00pm EST PKWare was ignoring the problem. Please contact them and tell them that ignoring *ANY* potential security violation regarding AVs is *NOT* acceptable. The method the programmer used is actually rather simplistic and easily implemented.

Complaints. The following are a list of common complaints about the new version. Some users consider them bugs while others consider them features. In all cases, please let PKWare know how you feel on the issues.

Some users have complained that PKZIP can't create compressed archives extractable by PKUNZIP 1.10.

PKZIP and PKUNZIP handle command-line parameters differently. PKUNZIP doesn't care about order- -)+ means disable *BOTH* DPMI and EMS usage. PKZIP, on the other hand, IS order dependant. -)+ means enable DPMI. -+) gets identical results to PKUNZIP. This inconsistancy only further confuses users and makes no sense.

PKZIP and PKUNZIP currently have completely separate methods of configuration. PKZIP uses a CFG file while PKUNZIP uses an environment variable. Some users have commented that this doesn't make sense- both

should use the configuration file. Either can easily ignore directives that do not apply.

The multi-disk spanning function is feature poor. Many users want the ability to create the files on a non-removable media for uploading or other functions. In other words, do it like ARJ does.

Several users have complained that the PKZ204C does not report older AV stamps. This is due to the old AV being compromised. PKWare's official stance is that due to this security break 204C should *NOT* report 1.10 AVs.

I would like to thank everyone who has contributed to this list, and there are too many to mention specifically. Keep the good work up and hope PKWare kills these bugs soon!

This list is posted to ILink PKWare and Shareware conferences, the RIME PKWare conference, and comp.compression. If you feel that this list would be of use to others please feel free to post it. In particular I would like to see it distributed onto Fidonet and other networks. My only request is that this message be posted in its entirety, including headers and footers. The contact information is most important. You may delete the tagline though! <grin>

If you have any more reports or can give substantiation on some of the bugs (batch, FAT problems, AV code) please contact me. I am available on ILink PKZip, RIME PKZip, and Internet in comp.compression or e-mail at gt0040a@prism.gatech.edu.

Tom Sorensen

--

Tom Sorensen gt0040a@prism.gatech.edu

"I believe OS/2 is destined to be the most important operating system, and possibly program, of all time." - Bill Gates, November, 1987

From root Mon Sep 27 18:25:16 1993
From: Rick Perley <rperley@aoc.nrao.edu>
To: abridle@NRAO.EDU
Subject: Re: forwarded message from LFERETTI@astbo1.bo.cnr.it
Date: Mon, 27 Sep 1993 16:25:14 –0600

Alan:

It's likely that those phased array data are o.k. for polarization, but we won't know until they are reduced. I won't be able to do that for some time -- I've got to take care of 3.5 millions new visibilities every single day! The all-sky survey has one of my feet firmly pegged to the floor for the foreseeable future.

So I don't know how to handle it. Perhaps we could ask for the time, but note that it might not be required? Pretty pathetic, but it's the best I can suggest.

I haven't heard any comment on my recommendation of getting some D-config data. Also, I do strongly believe that asking for only 3 hours is dangerous, regardless of what your (or anybody's) calculations might say. You can't have too much sensitivity in the polarization business, so we might better ask how much time we can possibly get, rather than how much we really think we need. I'd go for 6 hours, minimum. 3-hour requests are always granted.

Rick

From root Mon Sep 27 18:20:08 1993
From: Rick Perley <rperley@aoc.nrao.edu>
To: rl@mail.ast.cam.ac.uk
Cc: abridle, lferetti@astbo1.dnet.nasa.gov
Subject: Proposal
Date: Mon, 27 Sep 1993 15:07:31 -0600

Robert et al:

I think the proposal reads very well. I suggest only the following:

1) Be generous with time estimates. If we try to cut it too close to the wire, we probably won't get the sensitivity to see the polarization effects we need.

2) Ask for D config at the upper frequencies (C and X bands). Although this won't help much for the jet, it will make for a better overall image. Besides, there may be interesting lobe effects we don't anticipate. Don't scrimp on the request, either. Ask for at least 6 hours. Heck, I'd through in a couple hours in L-band as well. What's two hours to a Hog?

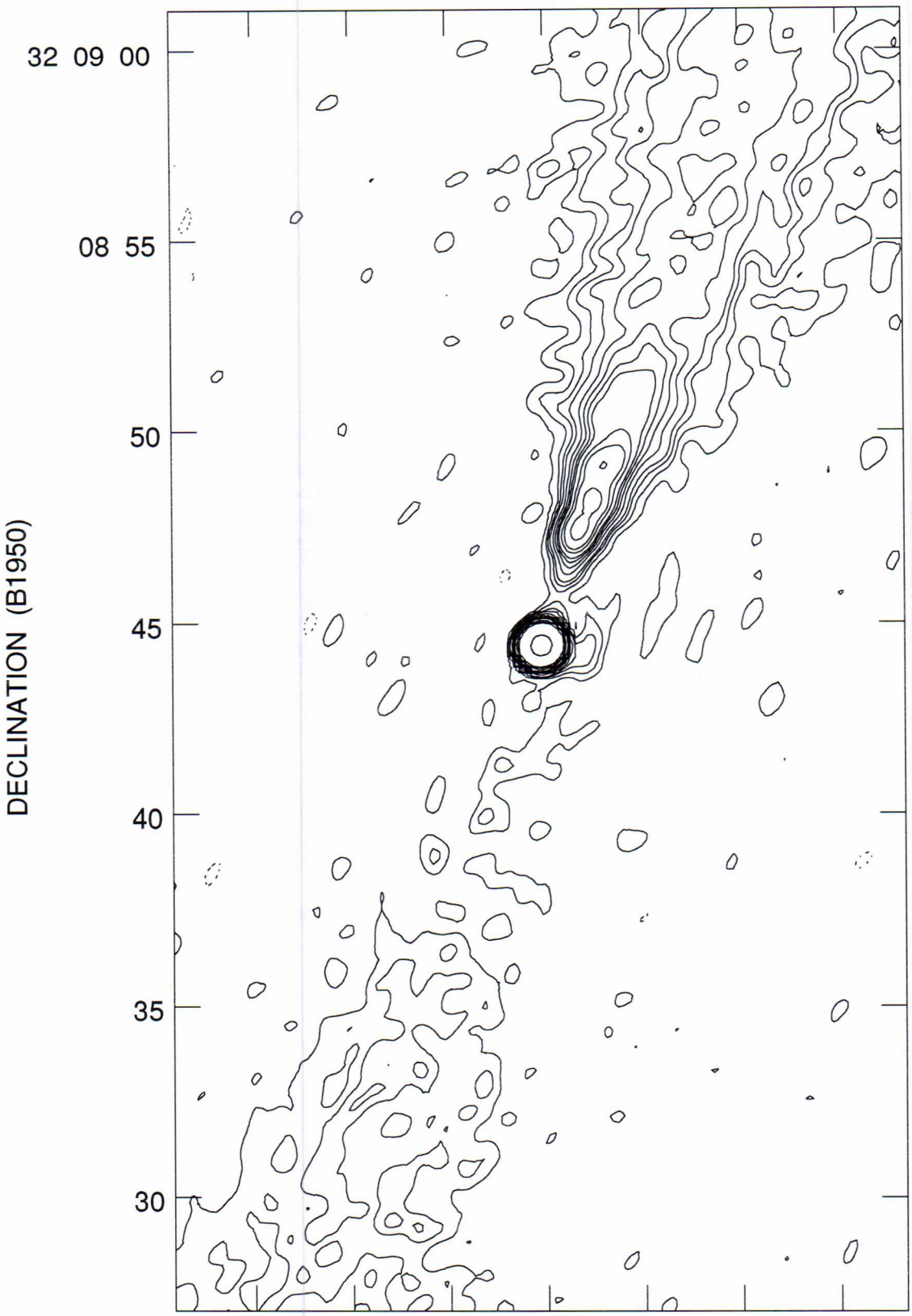
3) I don't have a strong feeling about A-config. at 6 or 3.6 cm. It's rather like a fishing expedition -- there might turn up something exciting, but probably not. We could always request A-config after the other data are in, and if something promising appears to be there.

4) In the Introduction, you might add Bicknell's new mega-paper (just accepted to Ap.J.) which expands (so to speak) his entraining jet model to mildly relativistic flows. He now believe that the bright bases of FRI sources are relativistic, and energetically compatible with the large scale , transonic flows. It's quite a remarkable paper.

Rick

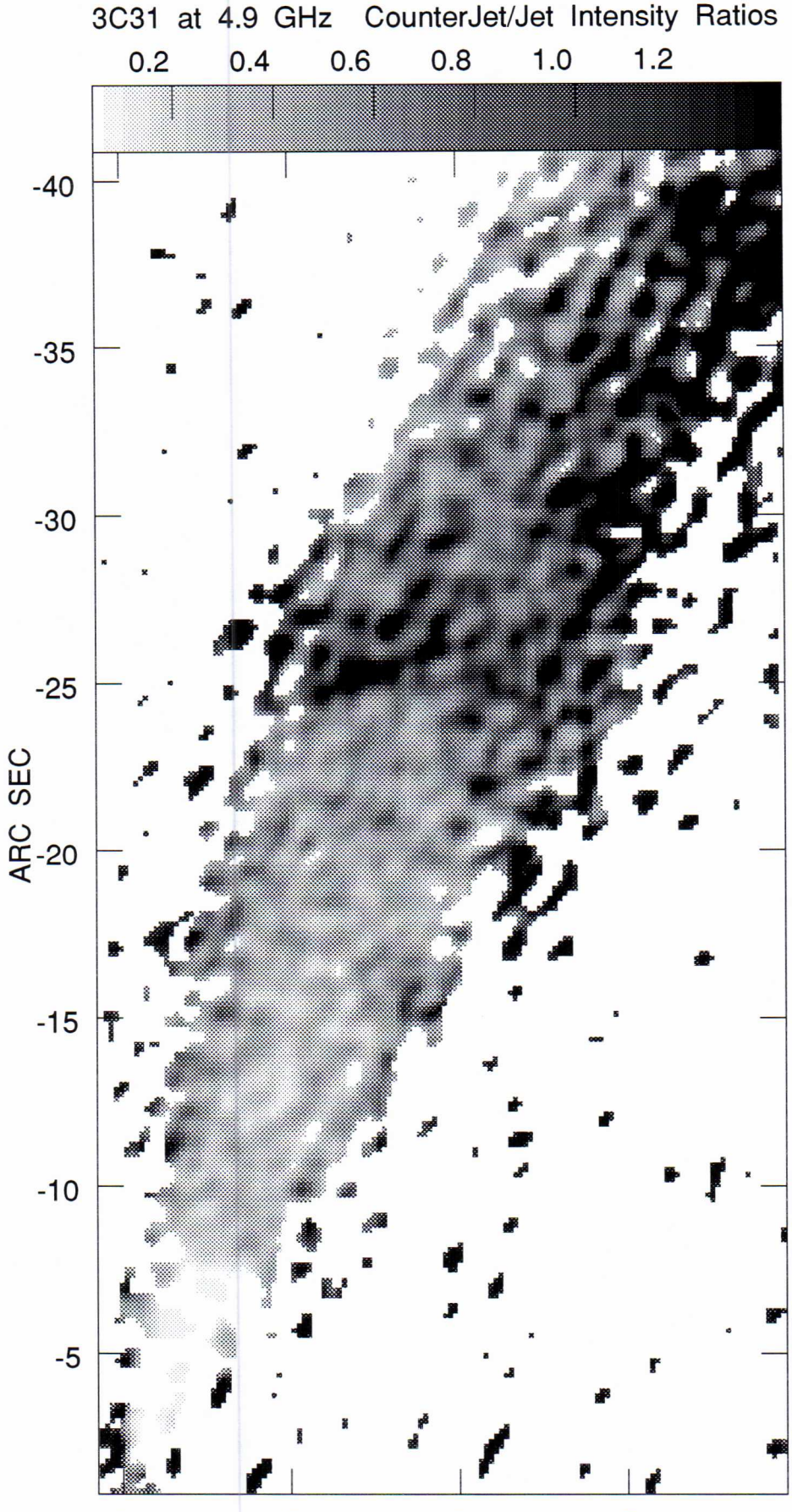
Figure 1

3C31 Inner Jet & CounterJet, 4.9 GHz, 0.55" resolution

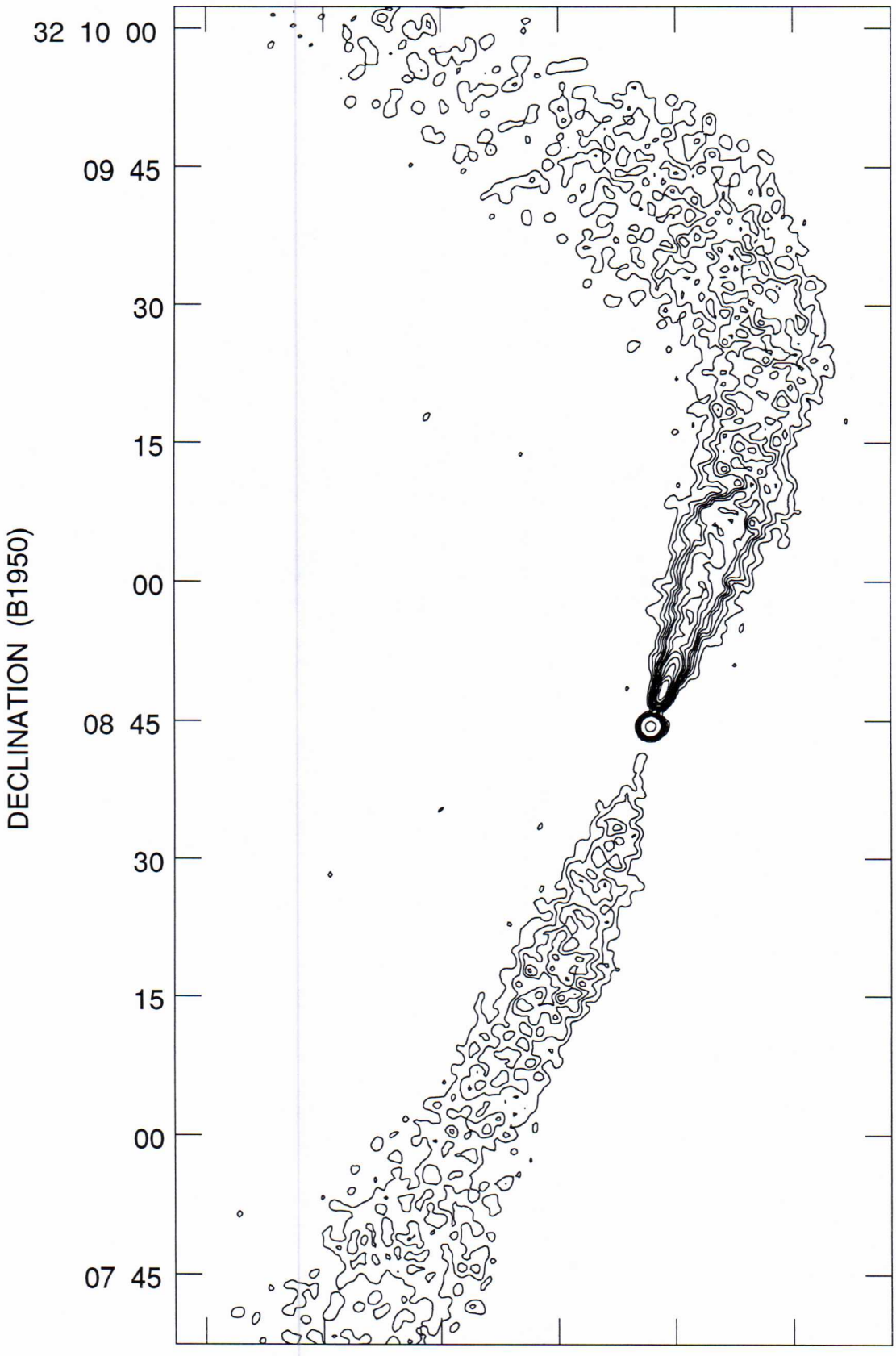


Peak flux = 1.0526E-01 JY/BEAM
Levs = 1.0000E-04 * (-2.00, -1.00, 1.000,
2.000, 3.000, 4.000, 6.000, 8.000, 10.00,
12.00, 16.00, 20.00, 30.00, 40.00, 60.00,
526.3 <--- shows FWHM

Figure 2



Core 0,0 at R.A. 01 04 39.200, Dec 32 08 44.40
Grey scale ratio range is from 0.050 to 1.400


PLot file version 1 created 07-JAN-1993 18:55:16
0104+321 IPOL 4866.350 MHZ 3C31C LOW.ICLN.1
32 10 00
09 45
30
15
00
08 45
30
15
00
07 45
DECLINATION (B1950)
01 04 43
42
41
40
39
38
RIGHT ASCENSION (B1950)
Peak flux = 1.0277E-01 JY/BEAM
Levs = 2.5000E-04 * (-1.00, 1.000, 2.000,
3.000, 4.000, 5.000, 6.000, 8.000, 10.00,
12.00, 16.00, 20.00, 24.00, 30.00, 205.7)

340, 802

SERC

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Telephone (0223) 374000
Central fax (0223) 374700

FAX MESSAGE

TO: SEE BELOW

FROM: ROBERT LAING
RGO

FAX NUMBER:
010 39 51 243130 , 010 1 804 296 0278 , 010 1 505 772 4243

DATE: 27/9/93

TOTAL NUMBER OF PAGES: THIS + 6

MESSAGE:

TO : LUIGINA FERETTI, GABRIELE GIOVANNINI,
PAOLA PARMA
ISTITUTO DI RADIOASTRONOMIA, BOLOGNA

ALAN BRIDLE, NRAO, CHARLOTTESVILLE

RICK PERLEY, NRAO, SOCORRO.

Dear All,

Here is a draft scientific case for the 3C 31 proposal. Please coul send any comments to me and to Alan Bridle, since I will be travelling over t next few days and may have trouble getting to read my E-mail, whilst Alan is as close as physically possible to the submission point. I failed to get through to ASTBO1 on the Span network, and have tried an Internet message instead, but it may be that the electronic copy only made it to NRAO.

Authors (unless anyone knows of someone else):

Luigina Feretti, Gabriele Giovannini, Paola Parma (Istituto di Radioastronomi
Alan Bridle (NRAO, CV)
Rick Perley (NRAO, Socorro)
Robert Laing (RGO)

I'd like advice on one question: based on the 3C 449 results, is it worth adding A-configuration data at 8 GHz? Given that we need to see the counterjet, we don't want to go overboard and resolve everything out, but the may be some advantage. Also, please feel free to mess around with integratio times: I'm a bit rusty.

Alan, please could you do the cover-sheet and add Figs (0.55 arcsec, construction configuration map would be fine: I am faxing a copies in case you don't have one around/on disk).

I shall be contactable via the Gemini project (jgrace@noao.edu for urgent messages) from Tuesday and will try to read my E-mail from then. There is a slight snag, which is that the meeting I am attending is not in NOAO and I ma have some trouble escaping.

Sorry for the short notice: I've been travelling and immersed in optical telescope garbage for most of the last month.

Regards, Robert

1 Introduction

Discussion of the origin of asymmetries in the jets of low-luminosity (FRI) radio galaxies has recently been revitalised by several observational and theoretical discoveries:

- apparent motions with speeds approaching c have been measured in FRI jets on pc and (for M87) kpc scales (Biretta & Meisenheimer 1993).
- unified models, in which FRI radio galaxies form the parent population for BL Lac objects, are increasingly accepted (*e.g.* Urry, Padovani & Stickel 1991), the implication being that relativistic velocities are common on pc scales in these objects;
- Parma *et al.* (1993a) discovered a relation between depolarization and jet sidedness in FRI sources, in the sense that the lobe containing the brighter jet base depolarizes less as the wavelength increases: the most straightforward interpretation is that the brighter base is seen through less magnetoionic material and is therefore on the near side of the source (as would be expected if the asymmetry were due to Doppler boosting).
- Parma *et al.* (1993b) have examined the variation of jet sidedness ratio with distance from the core, total radio power and core prominence. Their results are consistent with the hypothesis that FRI jets slow down from $\beta \approx 0.6$ to non-relativistic velocities on scales of 1 – 10 kpc.
- Laing (1993) developed a model of a two-component, decelerating relativistic jet which explains the correlation between polarization and sidedness in FRI jets (one-sided jets have longitudinal fields, whilst two-sided jets have transverse fields; Bridle & Perley 1984).

The purpose of the present proposal is to test the consistency of the hypothesis that FRI jets start relativistic and slow down on kpc scales in two ways: by measuring the structure and polarization of a twin-jet base in detail, for comparison with the models of Laing (1993) and by mapping the rotation-measure distribution of an FRI source which shows depolarization asymmetry in order to establish whether the Faraday effects arise from a foreground medium.

2 Observations of 3C 31

The source chosen for these observations is 3C 31. It is bright, has an asymmetric jet base, and shows a depolarization asymmetry. Our models suggest that the jet axis makes an angle of 60° – 70° to the plane of the sky. Previous observations are presented by Fomalont *et al.* (1980) and Strom *et al.* (1983). A recent reanalysis of construction configuration data by AHB (Figure 1) shows the base region in more detail. The jets are roughly symmetrical on large scales, but the base region is strongly one-sided, especially <10 arcsec from the core.

2.1 Morphology and Field structure

The starting point for this analysis is the two-component jet model considered by Laing (1993). Two antiparallel, but otherwise identical jets propagate away from a galactic nucleus along a direction which makes an angle θ to the line of sight. The jet cores have velocity $\beta_c c$ and contain a magnetic field which has no longitudinal component but is otherwise random. The surrounding shear layer has velocity β_s varying from β_c at the centre to 0 at the edges and its field is entirely longitudinal. β_c (and therefore β_s) decrease as the jets propagate away from the nucleus. Two effects of relativistic aberration cause the appearance of the jets to change as they slow down: firstly, the relative flux from the two components alters, since their Doppler factors are different and secondly, the degree of polarization of radiation from the core varies, since it is viewed at a changing angle to the line of sight in its rest frame.

The predictions of the model as they can be tested using 3C 31 are as follows:

1. We should be able to detect the counterjet in the "gap" region close to the nucleus, where it should have a longitudinal magnetic field with a degree of polarization higher than that at the same distance from the nucleus in the counterjet.

2. The counterjet should be limb-brightened close to the nucleus and, at all distances, the main jet should have a more centrally peaked brightness distribution, although the outer envelopes of the two jets should be similar. An analysis of the map shown in Figure 1 suggests that this is indeed the case, but the counterjet is not reliably detected close to the nucleus (Figure 2 shows a grey-scale of counter-jet/jet formed by rotating the map in Figure 1 by 180° and dividing it by itself).

3. The degree of polarization in the transverse-field region of the main jet should show a maximum, whereas that of the counterjet should rise smoothly with distance from the nucleus.

In principle, a map of the jet:counterjet ratio can be used to derive approximate velocity profiles both along and transverse to the jet.

The observations are complementary to those of 3C 449 carried out by some of the present authors. If relativistic models are correct, then 3C 449, unlike 3C 31, is very close to the plane of the sky.

3 Faraday rotation

3C 31 clearly shows a depolarization asymmetry in the sense that the side with the brighter jet base depolarizes less as the wavelength increases (Strom *et al.* 1983). We suspect that this is caused by foreground Faraday rotation due to magetised hot gas in the galaxy halo. To test this idea, we propose to make 5-frequency observations at a resolution of 1.2 arcsec. The observation of significant depolarization between 5 and 1.4 GHz at low resolution implies that we expect large variations of Faraday rotation over this frequency range, and we therefore propose to observe at 5 GHz and at 4 frequencies in the range 1.3 – 1.7 GHz in order to obtain adequate coverage in λ^2. We expect to resolve foreground fluctuations using a beam size of 1.2 arcsec, since this worked for 3C 449, which is at a similar distance (Cornwell & Perley 1984). Detection of λ^2 rotation for more than $\approx 90°$ of rotation without significant depolarization would be unambiguous evidence for foreground material. We expect to be able to measure the rotation measure profile along the jet and to compare it with the density profile of the X-ray halo in order to estimate the field strength.

4 Observational details

We require two sets of observations: high-resolution maps at a single frequency high enough that Faraday effects may be neglected, in order to study sidedness and polarization structure and multifrequency data at lower resolution to determine Faraday rotation. For the former applications we have chosen to make long integrations at 8.4 GHz in the B and C configurations (0.7 arcsec FWHM: slightly worse than the resolution in Figure 1 but with much superior brightness sensitivity). To determine Faraday rotation, we propose to use scaled arrays at 4.9 GHz and at 4 frequencies in the 1.3 - 1.7 GHz band (B+C and A+B arrays, respectively). This gives us a resolution of 1.2 arcsec.

We estimate from the 5 GHz map in Figure 1 that the inner counterjet surface-brightness is roughly 0.1 mJy/beam at 8 GHz. A 12-hour integration should be just adequate to detect the expected 30% polarization in the inner counterjet. We also request 6 hours in C configuration at 8.4 GHz to add short spacings. For the Faraday rotation study, we estimate that we need 6 hours in the A configuration and 2 hours in the B configuration at 1.3 - 1.7 GHz (4 bands) and 6 hours in the B configuration plus 2 in the C configuration at 4.9 GHz.

References

Biretta, J.A. & Meisenheimer, K. 1993, in Lecture Notes in Physics 421, Jets in Extragalactic Radio Sources, ed. Röser, H.-J. & Meisenheimer, K., (Berlin: Springer)

Bridle, A.H. & Perley, R.A. 1984, ARA&A 22, 319

Cornwell, T.J. & Perley, R.A., 1984, in Physics of Energy Transport in Extragalactic Radio Sources, ed. Bridle, A.H. & Eilek, J.A., (Green Bank:NRAO)

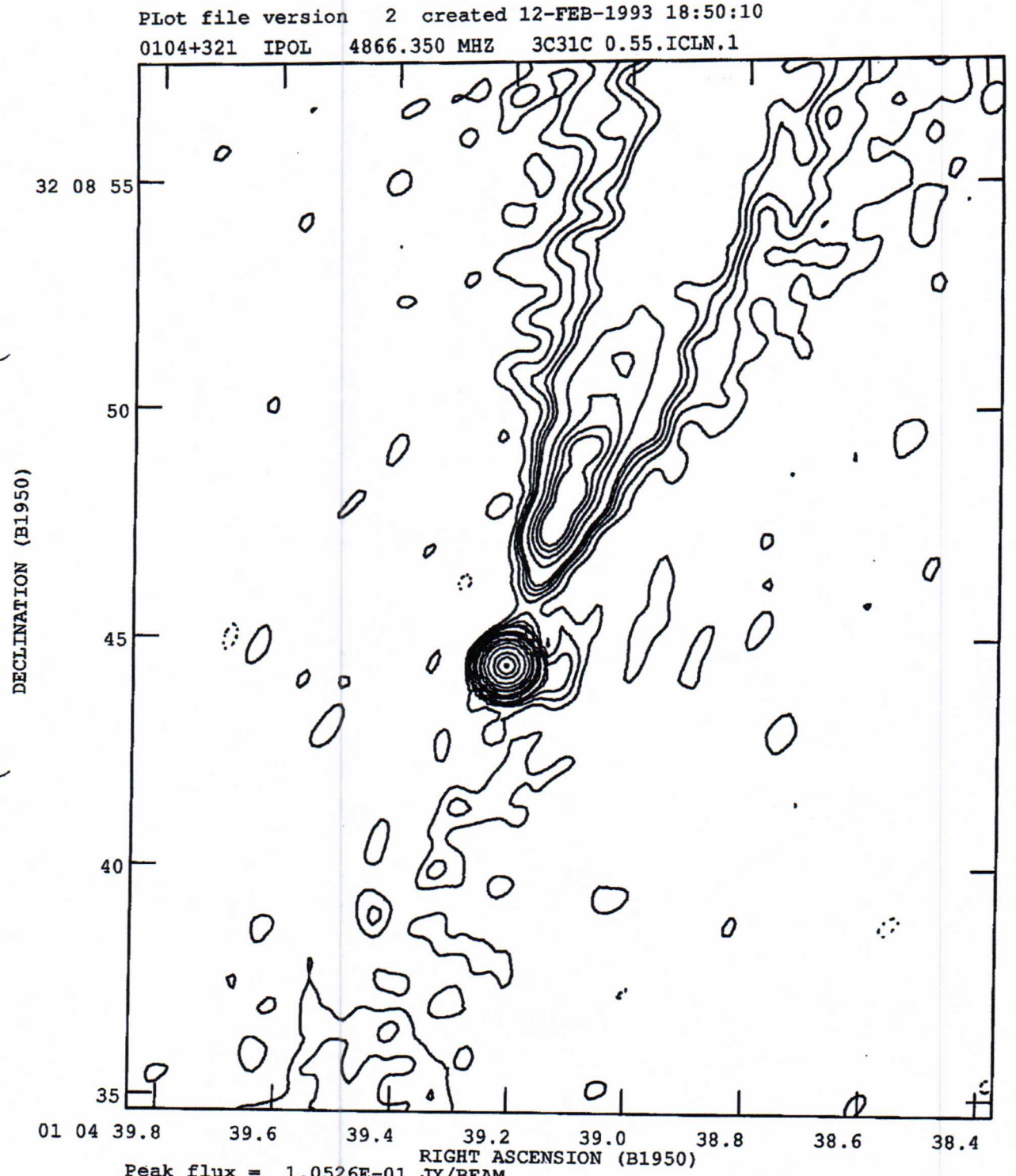
Laing, R.A. 1993, in Astrophysical Jets, ed. Fall, M., O'Dea, C., Livio, M. & Burgarella, D., (CUP: Cambridge) in press

Parma, P., Morganti, R., Capetti, A., Fanti, R. & de Ruiter, H.R. 1993a, A&A, in press

Parma, P., de Ruiter, H.R., Fanti, R. & Laing, R.A. 1993b, in The Physics of Active Galaxies, ed. Bicknell, G.V. *et al.* , (San Francisco: ASP), in press

Strom, R.G., Fanti, R., Parma, P. & Ekers, R.D., 1993, A&A, 122, 305

Urry, C.M., Padovani, P. & Stickel, M. 1991, ApJ 382, 501



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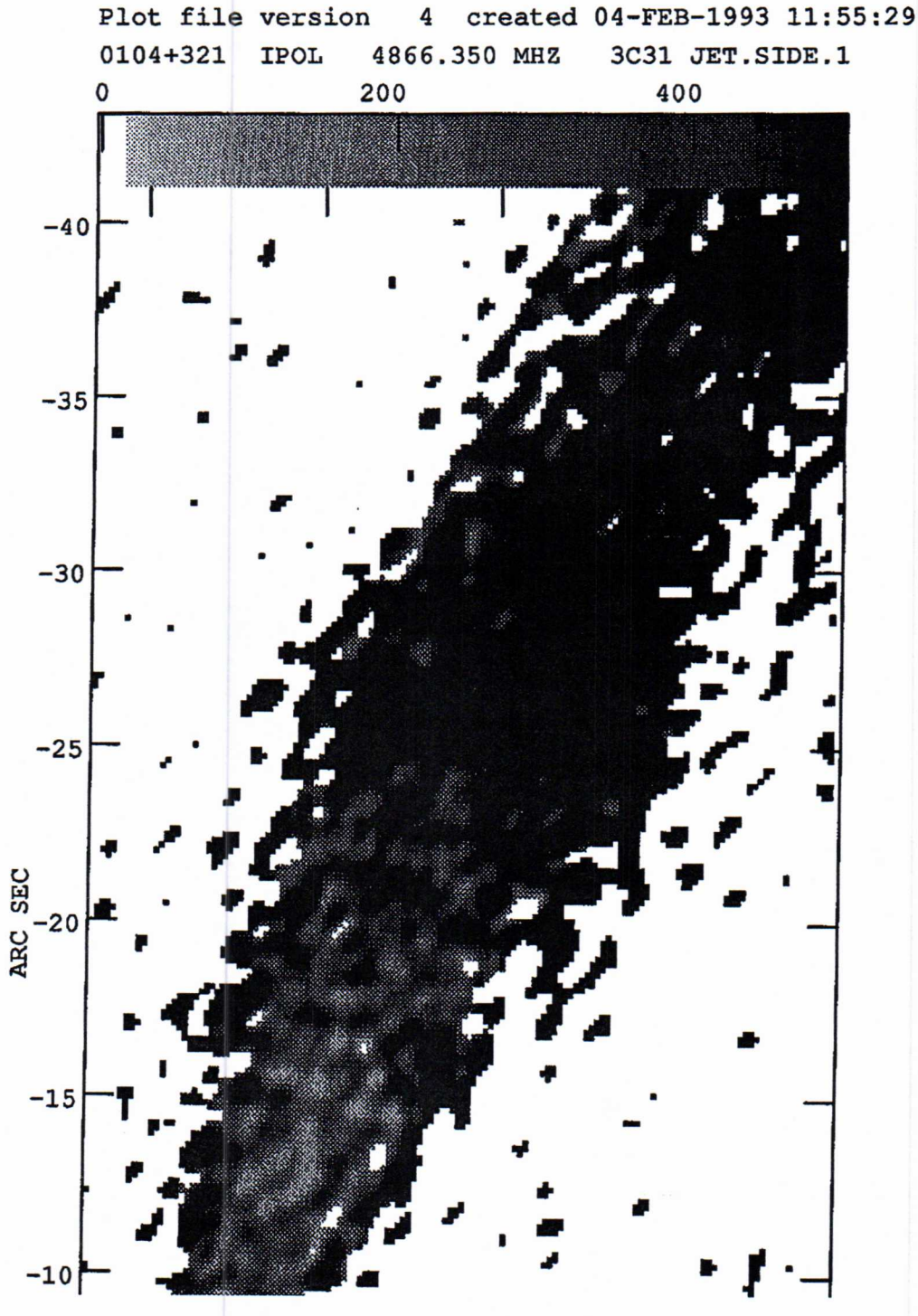
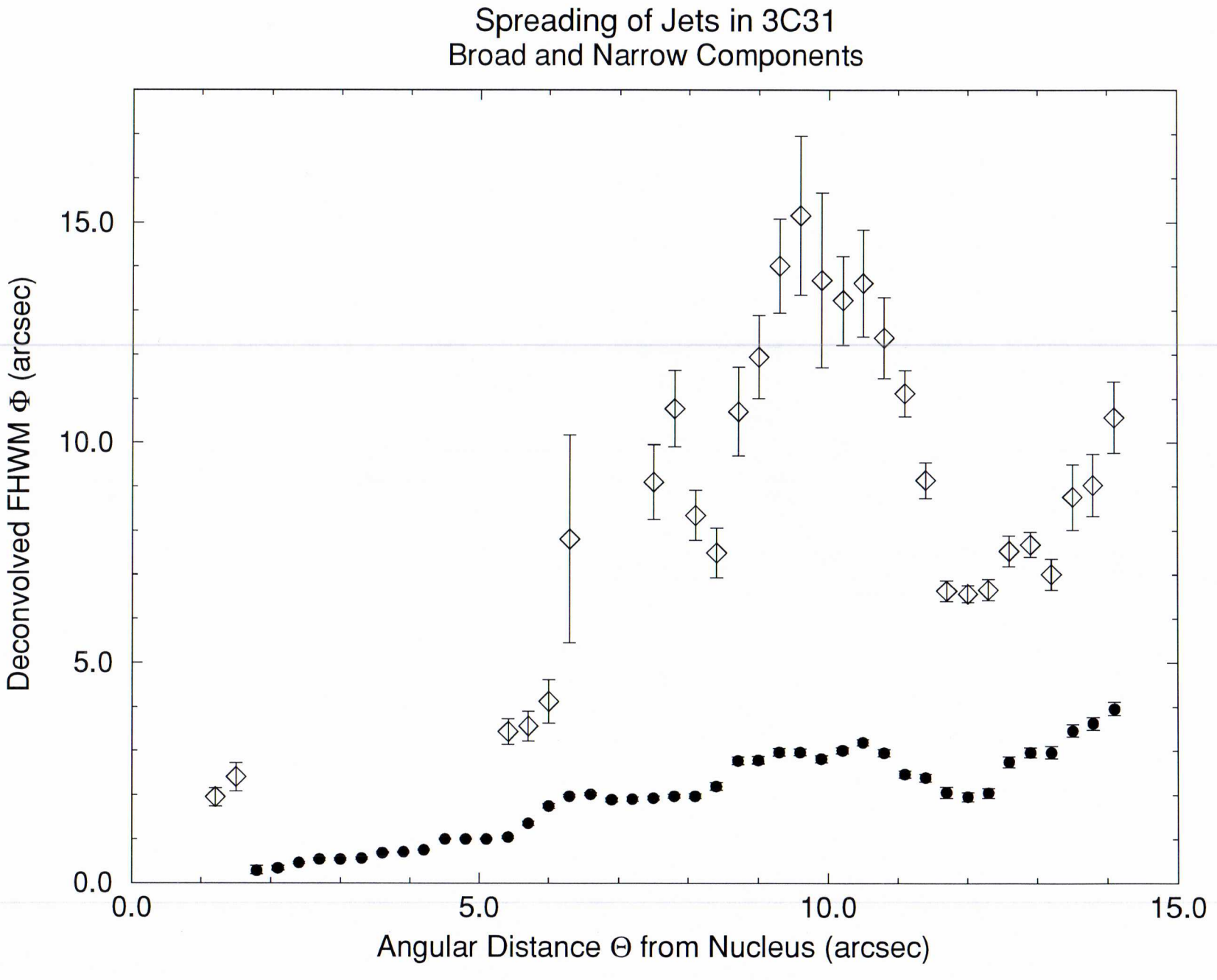
Levs = 1.0000E-04 * (-2.00, -1.00, 1.000,
2.000, 3.000, 4.000, 5.000, 10.00, 15.00,
20.00, 25.00, 50.00, 75.00, 125.0, 250.0,
500.0, 750.0, 1000.)


Plot file version 4 created 04-FEB-1993 11:55:29
0104+321 IPOL 4866.350 MHZ 3C31 JET.SIDE.1
0
200
400
-40
-35
-30
-25
-20
-15
-10
ARC SEC


Spreading of Jets in 3C31
Broad and Narrow Components
Deconvolved FHWM Φ (arcsec)
15.0
10.0
5.0
0.0
0.0
5.0
10.0
15.0
Angular Distance Θ from Nucleus (arcsec)

From root Tue Jan 12 13:44:59 1993
From: "Robert Laing, RGO, Cambridge" <"CAVAD::RL"@STARLINK.ASTRONOMY.CAMBRIDGE.A
To: ABRIDLE <ABRIDLE@polaris.cv.nrao.edu>
Subject: Things
Date: Tue, 12 Jan 93 18:45 GMT

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.

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From root Thu Jan 14 12:47:37 1993
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

From root Thu Jan 14 11:53:20 1993
From: "Robert Laing, RGO, Cambridge" <RL@STARLINK.ASTRONOMY.CAMBRIDGE.AC.UK>
To: ABRIDLE <ABRIDLE@polaris.cv.nrao.edu>
Subject: 3C 31
Date: Thu, 14 Jan 93 16:51 GMT

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.

Subject: Double peaked lines
Date: Thu, 16 Dec 1999 17:16:32 -0500 (EST)
From: Chris Palma <cp4v@superfly.astro.virginia.edu>
To: Alan Bridle <abridle@NRAO.EDU>
CC: fbauer@NRAO.EDU, bcotton@NRAO.EDU, srm4n@superfly.astro.virginia.edu, cls7i@superfly.astro.virginia.edu

Hi all.

Following up on the Axon et al. reference in Nature, I found the following reference:

Taylor, Dyson, & Axon, 1992, MNRAS 255, 351.

In this paper, they propose a model where the jet drives a bow shock into the ambient medium. They actually derive the resulting [OIII] 5007 profile as a function of inclination of the radio jets to the line of sight. For a jet entirely in the plane of the sky (phi=90), they have a symmetric profile, and for decreasing values of phi, the blueshifted component appears wider and with a smaller peak for certain of their models. This is exactly what I find when measuring the line profiles for NVSS 2146+82.

However, this model does assume that the NLR emission occurs due to photoionization of the shocked gas by the UV nuclear continuum. If I remember from colloquia last Spring, this is not the preferred model for the NLR, is that correct?

I have not had a chance to read and digest this entire article. I skimmed it and read a more recent article they wrote where they cite this model paper to explain some narrow band optical imaging results for Seyferts. It seems that this paper does adequately address the referee's comments in that their model as a function of angle to the line of sight predicts a double peaked line profile of the shape we find for 2146+82 at an angle that seems reasonable based on the radio morphology. We can cite this and maybe reproduce the model that best fits the 2146+82 line profiles we measure. Does this seem reasonable to everyone?

--chris

Chris Palma, cp4v@virginia.edu	The preceding was a work of fiction,
University of Virginia Astronomy	any similarities to persons living or
	dead, places, or events is purely
www.astro.virginia.edu/~cp4v	coincidental...