From abridle Tue Jul 30 17:07:09 1991
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          id AA29852; Tue, 30 Jul 91 17:06:55 -0400
Message-Id: <9107302106.AA29852@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: ifernini@nmsu.edu, jburns@nmsu.edu, rperley
Subject: Radio galaxy paper I
Date: Tue, 30 Jul 91 17:06:55 -0400

Dear Ilias, Jack, Rick

I've received Ilias' draft of the radio galaxy paper and am going through it now. I hope to have general comments by the end of the week. There's an immediate issue of consistency with the quasar paper that we need to think about right away, however, as it gets to the heart of how we define and measure cores and jets.

1. CORES

For "cores" it would be simple if the "central features" were all exactly pointlike, but they're not. Or if we had spectral data and were separating out flat and steep-spectrum components, but we're not. So we have to have a rule for deciding what we'll take as the "core" flux (core is a bad word as it's the base of the jet anyway, not the central engine, but I guess it's too deeply ingrained to change). In the quasar paper, I've been getting the "core" estimates by using IMFIT with a background component to model each central feature and its local background, then taking the fitted *peak* (not integrated) intensity. As a result, almost all of my "core" flux densities are somewhat lower than Ilias'. In most cases, the difference is minor and will, but for 3C334 and 3C351 I feel reasonably sure that Ilias's estimate includes significant amounts of jet emission. Here are the numbers as they stand, with the fitting errors (not calibration errors) on my estimates:

	Ilias draft	B. et al. draft	
3C9	5.24	4.9 +/- 0.05	(0.2)
3C47	73.64	73.6 +/- 0.1	(0.1)
3C68.1	1.15	1.13 +/- 0.01	(0.1)
3C175	24.9	23.5 +/- 0.1	(0.6)
3C204	28.4	26.9 +/- 0.1	(0.2)
3C208	51.6	51.0 +/- 0.1	(0.2)
3C215	17.03	16.4 +/- 0.2	(0.2)
3C249.1	72.45	70.8 +/- 0.1	(0.7)
3C263	157.3	157.3 +/- 0.5	(0.7)
3C334	138.25	110.8 +/- 0.1	(1.7)
3C336	21.34	20.4 +/- 0.1	(0.2)
3C351	14.24	6.5 +/- 0.03	(0.2)
3C432	7.46	7.57 +/- 0.02	(0.2)

On 3C334, I could not get a good one-component fit to the core, and the bulge in the contours that corresponds to what I think is about

25 mJy of jet-base component is fairly obvious. On 3C351, we have gross difference in which there are two peaks on the contour plot. The north-east peak is quite highly polarized, the south-west is weakly polarized and closer to the optical ID, so I am pretty sure that the south-west component is the best choice for the core. But I really don't think we can justify putting the sum of the two easily distinguishable components in as 3C351's core estimate.

The "true" error estimates are certainly larger than the fit estimates, and indeed I suppose one could make a case for using the difference between the peak and the integrated as an error estimator whenever this is larger than the fit error. Using just my fits, I would get the numbers in parentheses as the error if I did this. What do you think? (In any case, I think we don't want as many significant figures as Ilias has in some cases).

2. JETS

I'm afraid the situation with the jets is *much* worse, due to all the uncertainties about what is and is not jet. Ilias' thesis did a good job of demarcating what he had fitted and had used for ratios, but we will have a real problem boiling it down to just one number for the paper. There are two problems (a) definition of what is and is not jet, especially with regard to bright "spurs" sticking into the hot spots, and (b) lobe background corrections, which sometimes have huge gradients.

Let me just point out the worst, i.e. most difficult cases. If we can be consistent about these, it will be easy to negotiate the others, I think:

3C208 Problem here is confusion between the end of the jet, which brightens rapidly on its way into the lobe, and the final hot spot. Ilias and Jack ha.e the B. et al. draft, so let me refer to the problem area using their notation: the problem is where to stop between the last separable jet knot (D) and the peak of the final hot spot (B). Up to D, there is 3.9 mJy. Then the jet jets brighter and if you stop just short of the "ridge" at C you have a total of 9.3 mJy, whick knocks down to 8.3 mJy after a background corection. But B is highly elongated. The MEM image shows an unresolved knot at the extreme west end (probably the true "hot spot") and the rest of the emission as a bright narrow stream leading into it. I think this stream is a very bright end to the jet, and if you include it we have a total of 32 mJy in the whole jet. Ilias' estimate is 5.8 mJy, which comes from stopping between knot D and the ridge of feature C. I really think this is stopping too early, and leaving out the last segment, which in this case is very bright.

3C336 The nice, unarguable, straight segment down to feature C is about 10 mJy after background correction, but there's clearly more to it than that. C gets to be the problem: if you include it (38 mJy) and *all* of the neck into B you can add up to 75 mJy more. As Ilias quotes 52.8 mJy I think he's put all of C and a little bit of the weaker emission linking it to the straight segment into his integration. This corresponds to the dashed "blotch" in his thesis. It's a reasonable choice, except that C is much more compact than B,

so there's a case that C is the primary hot spot and B and the neck joining it to C are splatter structures. If we take the minimal-jet interpretation, as Ilias did for 3C208, shouldn't we take it here also, and only integrate up to the peak of C? (This would probably give us about 30 mJy total for the jet).

3C9 This one is hell on wheels so far as I'm concerned, as one can have reasonable estimates for the jet that differ by a factor of 100. The MEM image, and Colin Lonsdale's high-resolution picture, both show that feature F is the most compact one outside the core, unresolved at 0.12" resolution. So we have a straight piece of jet that terminates neatly at the 22-mJy feature F, containing all of 2.5 mJy. The thing then ricochets, broadens, and turns into the bright plume that wanders off into the lobe, amassing a total of 365 mJy. Depending on where we stop *this* integration, you can have a lobe-dominated or a jet-dominated source, to taste. Ilias has stopped 3C9 just *past* F, I'm really a bit puzzled why, to get his 68.2 mJy.

So what should we do? (I won't go into the other cases yet, as there's enough food for thought in these). When I gave preliminary numbers for the quasars at the Socorro meeting, I used "maximum jet" and "maximum counterjet" numbers for every source, i.e. I included all emission that could be "reasonably" construed as jet *on both sides*. In a few cases, such as 3C9, where we have evidence for a compact hot spot that is well recessed, I'm virtually certain those numbers are too big now. For any source, we could also stop the integration just short of the most compact hot spot candidate, and get a "minimum jet". Some, but not all, of Ilias' integration regions already correspond to this, I think.

What I'd like to suggest is that we give *both* maximum and minimum estimates in the tables for the radio galaxies and the quasars, to let the range illustvate the systematic (judgement) uncertainties (which are huge in some cases compared with the other errors). Then we could do the jet prominence analysis for the galaxies and quasars with *both* types of estimate. If the final answer depends on where we draw the line, we have to very circumspect in what we say. If it doesn't, it will be a stronger result than it seems now.

Another possibility is to increase the quoted errors to allow for the interpretative uncertainties source-by-source. But for 3C9, this would be awfully hard to explain! The next B. et al. draft attempts the Max/Min solution, by the way.

This will sound mostly like Greek to Rick as he hasn't seen the B et al. labeled plots. Would you like me to fax you them for 3C208, 3C336 and 3C9, Rick?

Cheers, A.

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      id AA24806; Tue, 30 Jul 91 17:19:43 MDT
From: jburns@NMSU.Edu
To: abridle@polaris.cv.nrao.edu
Subject: Re: Radio galaxy paper I
Date: Tue, 30 Jul 91 17:19:50 MDT

Alan:
      You've raised some very good points that
 we have wrestled with
for nearly a year here. Indeed, the best solution is to decide on
a compromise that is consistent for both the QSOs & RGs. Ilias and I
will carefully consider your comments & look for more detailed suggestions
later in the week.
      Thanks for taking the time to work on this.
      Cheers,
      Jack

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From: ifernini@NMSU.Edu
To: abridle@polaris.cv.nrao.edu
Date: Thu, 1 Aug 91 15:43:40 MDT

Hi everyone,

I received the last e-mail from Alan about some of the measurments I have
reported in the paper that the group received. I am going to work on these
measurements again, and I will report to the group in another mail what I
will find. Alan's comments about the jet and core measurements will be
taken into consideration. I believe that I will get different answers for
the jet measurements. The idea of "maximum" and "minimum" jet is good if we
all agree about a standard definition for the 13 QSOs and the 6 RGs. In any
case, we will give it a try.

Ilias,

Cheers

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From: ifernini@NMSU.Edu
To: abridle@polaris.cv.nrao.edu
Cc: ifernini@NMSU.Edu
Subject: Re: Radio galaxies paper
Date: Fri, 2 Aug 91 20:38:52 MDT

Thanks for the comments Alan. I will go over them more deeply in the few days
to come. About the observing run: well, we are more tha half through it. The
last run if for August 04. In the first run (July 17), we had the bad luck to
have 5 telescopes down for pointing error. For the second run (July 19) all
telescopes seemed to behave well. In total, we will be observing 8 RGs.
I will calibrate the whole data set before I leave to Saudi Arabia with some
preliminary mapping to see any interesting things.

Best wishes,

Ilias

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From: abridle (Alan Bridle)
To: ifernini@nmsu.edu, jburns@nmsu.bitnet, rperley
Subject: Radio galaxies paper
Date: Fri, 2 Aug 91 16:11:55 -0400

I've gone through the paper in some detail now, and will send an
annotated copy back to Ilias with detailed comments, as I have many
suggestions for the English, ways to shorten the paper, etc. This is
just to give you my overall reaction and some points that may need
some preparation time to think about. Overall, I believe the draft
is a substantial start on what we need, but only that - I think it
has a way to go before it's publishable.

Here are my main points.

1. I think it tends to lead the reader astray at the start by
asserting that we've detected all five radio jets. Compared to the
situation with the quasars, this is not so. We detected *unambiguous*
radio jets, using the BP criterion, in all 13 of the 13 quasars. In
this sample, there is only *one* equally unambiguous jet detection in
five cases - 3C22. If this difference can be well quantified, it's an
important datum and the paper has a good point to make on the issue of
jet detectability. I don't feel the present draft gets this point
across clearly (a) because it's emphasizing some very marginal jet
"detections" and (b) because it looks only at jet power tests, not
tests of jet-to-lobe ratio or jet-to-core ratio, about which the
unified models have some strong predictions.

2. We absolutely, positively, should not, must not, use the
depolarization ratio to decide which is and which is not the
counterjet side of the source! I feel *very* strongly about this.
It's a most important correlation while the jet/counterjet side is
objectively defined by unassailable criteria from the source structure
in I. Its strength, in the statistical sense, is then a good measure
of its significance and of its value to source models. The moment you
start *legislating* that the depolarized side must be the counterjet
side, and using this to bolster morphological evidence in
poorly-resolved or ambiguous sources, you throw away the best things
the correlations can do for us. So I find the discussion on p.18 about
which is and which is not the counterjet side in 3C324 very alarming.
I'm going to argue hard that we say no such things in this paper!
I think the *only* way to proceed legitimately here is to decide first
if we have an unambiguous jet. If we do, we know which is the jetted
side and which is therefore the counterjet side. If we don't then we
don't know which side is which and further statements about the
symmetry correlations are not useful.

3. It's useful that this paper has detected the cores for the first
time in several sources. The question of whether we've simultaneously
destroyed the evidence for the optical ID is important! I think it's
taken a bit too lightly in the present draft. In all cases, I'd like

to see the errors in the optical positions compared with the discrepancy. I'd also like to see the accuracy of our optical-radio alignment verified by comparing the assumed calibrator position with that of its optical identification (I've found this very helpful in the past, e.g. with 3C288 where Ed and I got a good coincidence after calibrating the radio image on the calibrator's optical position and only a "fuzzy" one using its radio position - sorry, Rick, to question a VLA position but them's the breaks sometimes!). If pe have good alignments in our optical/radio calibrator positions, then our position discrepancies will carry more weight, especially if the errors in the radio galaxy positions are the usual 0.5" or so and not several arcseconds. We should also give the radio calibrator positions in this paper as positional discrepancies are an issue throughout it. Alno relevant to the identification question is whether there's *another* ID candidate under our "errant" core positions. Has this been looked into? Can we be sure that 3C55 isn't a quasar, for example?

4. I'm worried, quite a lot, by the angular size bias that has been introduced by requiring commonality with the McCarthy optical study. The angular size difference is more significant than anything we quote about the jet power statistics. It's particularly worrying as it goes the opposite way from that in radio-galaxy vs. QSR statistics overall. This means that our RG's are systematically smaller than average for radio galaxies, as they would have larger-than-QSR sizes in a random sample. I think this needs more discussion than it's being given, and I'm also not sure what to do with it post hoc in any case. It's nice to have the optical data in hand, but if the sample has been tilted toward small sources in an unpredictable way in order to get it, it's bad news.

5. It was hard to interpret some of Ilias' comments on particular components because they weren't labeled on the plots. But I think the status of 'E' in 3C356 might be clarified if its elongation is known. If it's long in the jet direction, its status as a *possible* jet knot is a bit better. If its long in some other direction, it may still be a jet knot, of course, but then we're going to stay in the dark until we can find some more jet for it to connect to. Something should be said about what we do or don't know about its size and shape. As for 'B' in 3C324, a fit has been done and is reported but no conclusions get drawn from it. Is this just a lump in the lobe?

6. Lobes often have bright edges and, especially in radio galaxies, their filaments can be brighter than their jets. We therefore have to be particularly suspicious about jet "candidates" that run along lobe edges (though there are some good ones that do as in 3C111). The paper does lip-service to this "stringy confusion problem" on p.2, and argues that you need high-clarity imaging to sort it out (as we did in the proposals). But then it sort of slides off it in the discussion of the individual sources. I don't like that. It's not at all clear that we have enough resolution in 3C324 to say what we've got in the east lobe, or even in 3C55. If the jet candidate in 3C55 is indeed a jet, then the "gap" back to the core with no jet emission is unusually long in kpc. This may be the jet with the longest "blank zone" known in a radio galaxy. But given the contradictory shapes and polarimetry of the knot train (which are discussed), how sure can we be that this isn't just the lobe-edge effect? Maybe it's a lot more obvious on the TV screen if there is underlying connecting emission, but it certainly isn't obvious from reading the paper.

7. There's a lot of material that would be better off in Tables (hot spot sizes and
flux densities, distances, core flux densities etc.).
The paper would read much better if it was shortened by putting all this into a table, and then making the statistical statements about them all in one place. E.g. the bit about the jetted side being longer. 3C22 doesn't make a sample on its own, and we should talk about the evidence for this over the whole group (including the quasars). I'm bothered by just pointing it out where it fits, as in the text for 3C22. Some of the other text is also very repetitive source-by-source and could better be replaced with a Table.

8. I think the section on the data reduction is much too long given that it's standard stuff. I'm sending Ilias a marked version with some suggestions for radical deletions there.

9. There are several non-quantitative statements about the polarimetry. e.g. "highly polarized", "moderately polarized" etc. These should all be made quantitative.

I've held off from critiquing Sections VI and VII in detail because exactly what we do about them depends to some extent on how you want to respond to points 1 and 2. I feel we have:

one jet detection (3C22),
a jet knot candidate in 3C356,
two ambiguous cases (possible lobe-edge confusion) in 3C55 (whose status in the sample is now unclear because of the ID uncertainty) and 3C324 (for which an MEM image might help as it's resolution limited), and
essentially nothing in 3C265.

We might however be able to say quite a lot from survival analysis of the jet-to-lobe and jet-to-core ratios by contrast with the quasar sample, and thereby strengthen the basic case that Ilias is building - i.e. that this bunch has *not* turned out at all like the quasars.

Finally, the core-to-lobe prominence effect (RG cores being weak relative to the lobes) is not at all new, and the earlier work on this should be referenced. It's been done in bigger samples already, and we should be at pains to point out that what we found is consistent with the earlier work.

This is probably (more than) enough for now. I'll mail the detailed suggestions back to Ilias a.s.a.p. Will be Monday as our post has gone from here already.

How did the second observing run turn out, by the way?

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From: abridle (Alan Bridle)
To: ifernini@nmsu.edu, jburns@nmsu.bitnet, rperley
Subject: Jetted side longer?
Date: Mon, 5 Aug 91 13:30:12 -0400

This is to follow up on a detail re point 7 in my comments on Ilias' first draft of the radio galaxy paper. In the QSR draft, I've been looking at things that do and don't correlate with the arm length ratio of the lobes:

$$\text{Arm ratio} = \frac{\text{LAS on jetted side}}{\text{LAS on unjetted side}}$$

using the Leahy definition of LAS (distance from core to most distant emission you can plausibly consider part of the lobe). The enclosed encapsulated-Postscript file plots the one possible correlation I've found for the 13 QSRs. The graph in the file plots Fjl (the ratio of the integrated jet flux density to the combined flux density of both lobes) against the arm ratio. The sample is small, but there is some tendency to higher values of Fjl when the arm ratio is >1. Note also that there are 7 sources with arm ratio >1 and 6 with arm ratio <1. So among these 13 QSRs, there is no preference for the jet to be on the longer side. But when the jet *is* on the longer side, then it (may) tend to be more prominent relative to the lobes.

I'm going to look at this also in terms of normalized (per unit length) jet flux densities, but because the range of Fjl is greater than the range of arm ratios, the weak "effect" won't go away entirely if you normalize by the jet length. This is also such a small sample that I'm not sure whether to put much weight on the possible trend. I'm going to check it out with all of the jets in my comprehensive all-known-jets sample as soon as I can finish the LAS estimates for all of them. There are over 60 FRII's in that sample, and their statistics may help in confirming or denying any trends suggested by our small "complete" samples.

But I do think the QSR sample casts a somewhat different light on what Ilias is saying about 3C22 in the draft of the paper. I don't think there is any *general* trend for the jetted side to be longer in these FRII sources, but it may not surprise us that the radio galaxy with the *most prominent* jet in our sample so far has its jet on the longer side.

Postscript file follows: clip out and send to your local PS printer:
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From: abridle (Alan Bridle)
To: ifernini@nmsu.edu, jburns@nmsu.bitnet, rperley
Subject: Sample of 62 FRII's
Date: Mon, 5 Aug 91 16:39:15 -0400

I've now looked at the jet-prominence versus arm length ratio statistics
for the following sample:

All jets in bona fide FRII (classical edge-brightened double) extended
sources with z<1.5 and logP(1.4 GHz) > 25.5 W/Hz, whose jet and lobe
flux densities are in my jet database. There are 62 such sources, 18
of which are classified as radio galaxies, 44 classified as QSRs.

		Number	<Jet-to-lobe flux density ratio>
RG's	arm ratio <=1	5	0.0204 +/- 0.0062
	arm ratio > 1	13	0.0197 +/- 0.0086
QSRs	arm ratio <=1	14	0.0359 +/- 0.0208
	arm ratio > 1	30	0.0826 +/- 0.0239

The averages in the < > brackets are straight arithmetic averages over
the ratios (perhaps not the best thing to look at, I guess averaging
the logarithms of the ratios is better). This larger sample, whose
completeness is uncertain but which may be representative just by size
alone, seems to suggest the following:

1. There may be a preference for the brighter jet to be on the longer-
    armed side after all, by about 2:1. In the 13-QSR sample this may
    simply be "hidden" by the small numbers. (That sample has several
    almost-symmetric sources that get counted in the jet-on-short
    side bin. If you look at the *extrema* on the plot I sent this a.m.,
    there are more long-armed jets than short-armed jets by about 2:1,
    as in this larger sample. Hindsight is so clear!)

2. The radio galaxies don't show much sign of the jets being more
    prominent when they are on the long side, but the bigger sample of
    quasars *definitely* does. This looks like quite a strong effect
    in the bigger sample. Curiously, it also has the sign you'd
    expect in most naive relativistic-jetwmodel, whereby the approaching
    (brighter) jet should appear longer. This naive model would assume
    that the arm length ratio is determined by time-of-flight effects
    however, and I don't see why that should be so for a well-
    developed lobe whose jet has been "flapping" or "drilling" for some
    time. Anyone think it might still be significant?

So -- there may well be something asymmetric going on in the arm
length ratios and the jet prominence, but the prominence effect may be
confined to the quasars. Note also that the average jet prominence in
the big sample is greater for both sets of quasars (jet longer and jet
shorter) than for the radio galaxies of either symmetry. This is as

one might expect from the unified model.

What to conclude from this? My main conclusion as that we'd better be really careful (more careful than I was this morning!) about what we say from our small samples - either about the jet-is-longer asymmetry or the jet prominence asymmetry. But clearly there may be a real effect whereby there is an enhanced prominence for the long-side jets in the *quasars*. I am also thinking that large *complete* samples might really show us something. Too bad the VLA referees are so stubborn about not giving groups time to investigate this properly!

Any comments?

I can send the Fjl vs arm ratio plot for the bigger sample if you're interested.

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id AA04426; Mon, 5 Aug 91 20:21:46 -0400
Message-Id: <9108060021.AA04426@polaris.cv.nrao.edu>
Received: from NMSU.Edu by nmsuvm1.NMSU.Edu (IBM VM SMTP V2R1) with TCP;
Mon, 05 Aug 91 18:26:34 GMT
Received: from dante (dante.NMSU.Edu) by NMSU.Edu (4.1/NMSU-1.18)
id AA22953; Mon, 5 Aug 91 18:26:41 MDT
Received: by dante (4.0/NMSU)
id AA08823; Mon, 5 Aug 91 18:26:38 MDT
From: @nmsuvm1.NMSU.Edu:jburns@NMSU.Edu
To: abridle%polaris.cv.nrao.edu@nmsuvm1.NMSU.Edu
Subject: Re: Sample of 62 FRII's
Date: Mon, 5 Aug 91 20:21:46 -0400

Alan:
This asymmetry in arm ratios is quite interesting & stronger than I, too, would have expected from looking at other smaller samples. I'm concerned also about making too many statements from the really quite small sample from Ilias' thesis. I've let Ilias' try to "run" with this a bit & see where it leads. Tuus, the draft of Paper I, although naive in spots, gives Ilias a chance to learn what will fly & what won't from interacting with his colleagues. These last few E-mails from you have been very useful since it allows him to have other input from just me. He has begun working on cranking out some new numbers on the core, jets, & lobes as you suggested. I've advised him to phone you up, however, to talk more about the difficulties in making these measurements. He's been very careful, but the measurement philosophy that we've adopted may not always be consistent with your's in every case. I'm sure that we can converge on this rather quickly.
Thanks for all your help,
Jack

From root Tue Aug 6 20:04:47 1991
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
["3686" "Tue" "6" "August" "91" "17:55:02" "MDT" "Rick Perley"
"rperley@zia.aoc.nrao.edu " nil "60" "My comments on the paper" "^From:" nil nil
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Received: from zia.aoc.nrao.edu by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA29207; Tue, 6 Aug 91 20:04:45 -0400
Received: by zia.aoc.nrao.edu (4.1/SMI-DDN)
id AA03024; Tue, 6 Aug 91 17:55:02 MDT
Message-Id: <9108062355.AA03024@zia.aoc.nrao.edu>
From: rperley@zia.aoc.nrao.edu (Rick Perley)
To: abridle@zia.aoc.nrao.edu, ifernini@nmsu.edu, jburns@nmsu.edu
Subject: My comments on the paper
Date: Tue, 6 Aug 91 17:55:02 MDT

Sorry for the delay -- I won't bore you with the usual excuses.

I agree with Alan on his #1 point -- much too much is made of the `detections' of jets and counterjets. In my view, there is only one jet detection. The rest of the `detections' are based more on wishful thinking and hopeful interpretation of the data. Sorry guys, but a know, or even a row of knots, does not constitute a jet detection.

I am not as alarmed as Alan about the use of the Depolarisation Ratio to decide which side is jetted and which is not. After all, the correlation shown by Garrington et al is very very strong. On the other hand, I see no need to include this section in the paper -- the depolarization evidence is cited in a yet-to-be published paper. From this paper, one cannot decide if the Depolarization Ratio is sufficient to be considered significant evidence for which side *might* be the jetted side. So I'd agree to drop this line of reasoning.

About calibrator positions. About 1% of calibrators had arcsecond errors, due to aliasing in the original imaging that I did. The chance that two random calibrators be off this much is pretty small. But we can check this in a number of ways. First, what calibrators were used, and what positions did they have? I can check that against the current calibrator list -- many sources have updated positions taken from the Goddard or JPL astrometric lists. Second -- calibrator errors of the magnitude required to cause the observed positional offsets are HUGE!, and should be immediately visible in the data. Do you have listings of the CALIB solutions (B-configuration preferred), showing that some calibrators were stable, and others (the ones used for the two sources in question) were not? Third -- compare the radio hotspot positions against previous work. (This is not airtight -- the previous workers may/probably have used the same calibrators). Fourth -- try Alan's suggestion.

Angular sizes. By throwing away 8 sources whose angular size exceeds 100", haven't we effectively thrown out any hope of making a meaningful comparison with QSR's, independent of whether the optical bias introduced by requiring commonality with McCarthy's work?

I agree with Alan's points 5, 6, and especially 7.

Absolutely, scrap the section of data reduction. Nothing original, or even interesting, here. Old Hat, I'm afraid.

Now for some of my own comments.

Page 25, the discussion on optical depth hiding the jet. I'm VERY sceptical about this. The equation (1) leaves out both the temperhture and frequency factors -- the latter is most important. The optical depth runs as wavelength squared, so tau = .6 at some radio wavelength means total absorption at a slightly longer wavelength, and no absorption slightly shorter. Note that even if you could arrange to `hide' the jet this way, what about the lobes? At lower frequencies, the `C-J' side should be completely absorbed -- both lobe and jet. We should easily see a lobe assymetry at 21 cm, for example. No such asymmetry comes to my mind.

page 26, DP asymmetry. Darned if I could understand just what is going on here. The equation (3) is inappropriate here -- this is the

depolarization caused the MIXED synchrotron emission and thermal absorption -- i.e., the thermal gas would have to be in the lobes. Most people (including me) don't think this a likely possibility. The depolarization is due to RM gradients, for which a different equation must be employed.

There are dozens of problems with the English, but since Alan is sending a marked copy to Ilias with suggestions, I'll await the next draft.

Rick

From abridle Wed Aug 7 10:37:25 1991
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
["4013" "Wed" "7" "August" "91" "10:37:19" "-0400" "Alan Bridle" "abridle "
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Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA28354; Wed, 7 Aug 91 10:37:19 -0400
Message-Id: <9108071437.AA28354@polaris.cv.nrao.edu>
References: <9108062355.AA03024@zia.aoc.nrao.edu>
From: abridle (Alan Bridle)
To: rperley@zia.aoc.nrao.edu (Rick Perley)
Subject: Re: Your comments on the paper
Date: Wed, 7 Aug 91 10:37:19 -0400

I see we are in good agreement re the paper, which seems to get weaker as I read it. I'm especially bothered by the size selection in the RG sample. I don't recall Jack or Ilias ever discussing that with us, in fact. Did they do that on their own? If so, I think we may need yet another follow-up proposal to clean the sample up. (Pity, as there was enough B array
time to have done more of the extended sources, I think).
I'm reserving judgement at the moment about whether there's really enough in this paper for it to be worth publishing. I will be rather tempted to say "let's wait for the rest of the sample" in any case, now that the data are in hand. I hope this will not be another of Jack's "rush to press" efforts!

Your points about the calibrator positions and the ID discrepancies are good ones, of course. I do have some suspicion about the optical positions of the ID candidates, which is why I was asking Ilias to look up their errors, as well as to check the calibrator radio positions that way. I found something like an 8" error in the optical position that generations of papers had quoted for 3C208 based on what must have been a typo in Sandage's ID paper. When I remeasured everything myself on the CIA engine, the optical and radio positions were in the usual agreement. The 3C288 case was a much smaller error, under 1", and the sort of thing that's much easier to explain as an outlier in the VLA calibrator net.

On another matter, I'm starting to get really intrigued by the correlation I've been kicking around this week in the "all-the-jets-I-can-find" sample ("son of Bridle-Perley review sample, now over 350 sources!). It really does look to me as if:

(a) there is indeed a tendency for the brighter jet in the FRII's to be on the longer side,
(b) for the quasar jets in FRII's to be, on average, more prominent relative to the lobes when they are on the longer side.
(c) for the quasar cores in FRII's to be much more prominent relative to

the lobes when the jet is on the longer side.

I'm going through the sample from rather carefully now, to make sure I've used consistent LAS criteria while entering the data over several years, and to filter out some cases that should not be used for this analysis because of complicating factors (e.g. my default sample contained the gravitational lens quasar!).

But I'm struck by the factsthat the "prominence asymmetries" (b) and (c) affect the quasars and not the radio galaxies. Also, that the length asymmetries are rarely greater than 2:1 and one *might* still be able to explain them in terms of very slightly relativistic advance velocities for the working surfaces, as was the "party line" in the 1970's. It may work particularly for the quasar subset if there is an orientation bias as in the "Barthel" unification. (Don't you think we should keep pointing out that this was a unification`that *we* suggested in our Annual Review paper by the way?).

If you can steal the time for some science thinking, I'd really be interested to hear what you think about this core and jet prominence versus length-asymmetry effect showing up in the quasars and not in the radio galaxies. I'm digging back through the Garrington et al. and Saikia papers to see what they said about the arm-length asymmetry. They all noticed some asymmetry, but tended to dismiss it based on looking at the mean value of the arm ratio across their whole sample. The *numbers* of long- and short-jet sources in their samples *are* unequal, however. They were also using rather low-resolution data, and at least in Garrington et al.'s case they were measuring the asymmetry between the lobe centroids ("component positions") rather than from the "farthest point" LAS which I am using. I'm wondering if there is an arm-length effect here that has simply been missed, and which correlates very nicely with the prominence statistics. I may try to work this up for inclusion in my review at the College Park meeting in October.

From abridle Fri Aug 9 12:46:19 1991
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      ["3634" "Fri" "9" "August" "91" "12:46:12" "-0400" "Alan Bridle" "abridle "
nil "63" "Talk with Ilias" "^From:" nil nil "8"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA06477; Fri, 9 Aug 91 12:46:12 -0400
Message-Id: <9108091646.AA06477@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: rperley
Subject: Talk with Ilias
Date: Fri, 9 Aug 91 12:46:12 -0400

Just had a long talk witb Ilias re the paper.

Basically decided that the issue about jet definition is really an issue about deciding which/what is the terminal hot spot, i.e. that the "minimum" jet is an integration up to but not including the first plausible candidate for a hot spot that might partially or totally slow down the primary outflow, and the "maximum" jet is an integration up to but not including the last plausible such feature. In some cases there is little ambiguity about which is the hot spot, so little uncertainty about what to integrate. I've suggested that the "spurs" or T's going upstream from the hot spot should be included in the maximum jet if they are pointing back at the jet. Anyway, these are differences that make small details in most sources, but huge differences in some, e.g. 3C9. By book-keeping them, we will indicate (a) the range of uncertainty due to systematic classification problems source-by-source and (b) how much flux density in each source could plausibly be attributed to "secondary outflow" from a primary jet stopping point. Both of these seem worthy goals to me, and Ilias seems happy with the prospect.

We also got onto the subject of the small sample size and waiting for the new data. Turns out that Ilias also would prefer to wait until the second observing session is reduced (i.e. he agrees with us). He feels that Jack on the other hand wants to hurry things along. I'll wait to see what Jack actually suggests to us after he's talked with Ilias now. No point harassing him if he might come around without it anyway.

On the positional-discrepancy thing, I think I got the message through to Ilias that we can't just write off a 5" problem, but have to find out why it's there. Possibilities are:

1) 3C55 is identified with another object, so isn't in the sample really.
2) 3C55 is identified with the right object, but its optical position is lousy.
3) 3C55 is identified with the right object, but with a ropey optical position and a ropey radio calibration that have conspired to give a big apparent error.

Ilias has understood your point about (3) and will check his records. Also will check optical position of the calibrator. On (2), the real answer is to remeasure the optical position of the ID. 5" mistakes are not impossible (e.g. my encounter with Sandage's 3C208 position), and someone may even have measured the wrong object. But this is a Spinrad position and Ilias is going to get in touch with McCarthy to see whether there was ano confirmation of the position when they did the optical observing. Given the way these guys use finding charts for their pointing, there may

not be. But a check with McCarthy won't hurt either. If it turns out that all the positions are o.k. and (1) is right, the sample shrinks yet again and the case for consolidating with the second observing run is strengthened.

He told me he will have workstations in Riyadh, so he's hoping to finish the calibration of the data her and be able to do analysis there. It's an allegedly 50-50 teaching-research position. I asked im if he'd taught before and whether he though he'd really be able to make 50% of his time for research in the first year (told him how difficult it was for most people). He's well aware of the problem, and has taught before. But he's properly skeptical of how much he will get done in the first 12 months.

To my mind, if it takes a year to get this bundled up properly into a sample whose size is the same as the QSR sample, then so be it. It will be worth it in the end. I doubt that Jack will be so patient, however.

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Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA31359; Mon, 26 Aug 91 11:33:59 -0400
Message-Id: <9108261533.AA31359@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: ifernini@nmsu.edu, jburns@nmsu.edu
Subject: Min and max jets in quasars - AHB estimates
Date: Mon, 26 Aug 91 11:33:59 -0400

Just found Ilias' message from last week. Here are the minimum and maximum flux densities for the quasar jets, with explanations based on the notation on our contour plots. It sounds as though, in some cases, I have been less conservative in seeking the "maximum" possible jet than Ilias. We may need to discuss these (I'm not deeply dug in on any of these, I thought it was worth leaving the window open fairly wide so we could look at the maximum uncertainties that can come from classification criteria before making our final decisions). I use the < sign below to mean "up to but not including", and have added the flux densities from Ilias' draft of the paper for handy reference.

3C9	Minimum <F	2.5 mJy	F is most compact feature on MEM image
	Maximum <K	365 mJy	!
	Paper draft	68 mJy	
3C68.1	Minimum D	2.1 mJy	Based on integrations of feature D only
	Maximum	15.3 mJy	includes ridge in N lobe on jet path <C
	Paper draft	<15.6 mJy	
3C175	Minimum <D	13.3 mJy	
	Maximum <C	20 mJy	
	Paper draft	17 mJy	
3C204	Minimum <D	7.4 mJy	
	Maximum <B	93 mJy	
	Paper draft	8.2 mJy	
3C208	<B	29 mJy	B is definitely the hotspot from MEM
	Paper draft	5.8 mJy	
3C215	Minimum <G	27 mJy	
	Maximum <H	42 mJy	
	Paper draft	37 mJy	
3C249.1	<K	51 mJy	large uncertainty in bdrg corr., this is +/- 8!
	Paper draft	46 mJy	
3C263	Minimum <J	8.9 mJy	
	Maximum <K	37 mJy	huge uncertainty in lobe correction, +/- 11 mJy
Paper draft	9.5 mJy		
3C334	Minimum <O	52 mJy	NB includes 25-mJy core extension in jet
	Maximum <S	84 mJy	includes core ext, all of lobe boundary "stream"
	Paper draft	26 mJy	

```
3C336   Minimum <C   9.4 mJy
        Maximum <B   76 mJy
        Paper draft  53 mJy

3C351   Minimum <G   18.5 mJy  NB only compact component included as core
        Maximum <J   23.3 mJy  NB huge uncertainty in outer jet integration
        Paper draft  4.8 mJy

3C432   Minimum  C   0.74 mJy  integration over detached knot only
        Maximum <G   1.8 mJy   NB huge uncertainty in lobe correction
        Paper draft  <0.85 mJy

Comments:
=========

3C9     The max and min estimates bracket your original one, but with huge
        variance, as we've discussed already.
3C68.1  I guess your upper limit includes the northern extension.  The
        extension looks real enough to me on the images themselves, and it
        consistently integrates positive after the background correction.
        It might however be a lobe filament.  The knot integration is well
        defined at all resolutions, seems a firm lower limit to me.
3C175   This is just a case of which is the terminal hot spot.  Two plausible
        candidates. Paper draft seems to have split the difference.
3C204   Paper draft and minimum case agree well.  Only uncertainty is whether
        to include the "richochet".
3C208   As in my original mailing: I think there's no uncertainty, B is the
        most compact feature and I think we must integrate up to it.  The
        draft stopped well short of this, hence the much lower flux density.
3C215   Paper draft is probably an estimate of maximum case with a different
        lobe correction. Lobe corrections a bit uncertain here.
3C249.1 No problem despite lobe correction being uncertain!
3C263   The only ambiguity is with the extension of the hot spot and whether
        to include it.
3C334   I think there is much ambiguity here. Note that I have included the
        25-mJy extension of the core as "jet base" in both estimates; my
        minimum case is other wise same as paper draft, in fact.  Ambiguity
        comes from the "maximum", which according to our new terms of
        reference should include all of the richochet around the lobe?
3C336   Similar problem, lots of emission in the richochet, paper draft must
        have "split the difference"
3C351   Biggest difference between us was the core identification, as with
        3C334.  Here I think it's clearer, as in this case there are actually
        twin peaks in what you were taking as the "core".  The status of the
        outer jet is maddening, it looks clearly there on the images, but it's
        on a lobe gradient that makes the background correction really hard
        to determine.  Could also be a lobe filament.  Fortunately most of
        the flux density is close to the core, so the uncertainty comes
        mainly from the core, not from the extension.
3C432   The detached knot integrated reliably for me.  The main uncertainty
        is in getting the weak extension out of the lobe against a complex
        background.  I presume the upper limit in the draft was based on a
        knot integration, but I'm a bit puzzled as to why it was treated as
        an upper limit there.

From abridle Fri Feb  7 16:23:12 1992
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Message-Id: <9202072122.AA21089@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: rperley
Subject: Ilias' draft
Date: Fri, 7 Feb 92 16:22:53 -0500

I just got my copy of the redraft from Ilias.

I think he's responded to all of the small details that I sent him after the first draft, but has essentially bypassed the biggest issues (which include whether or not this paper is even justified!). Doubtless this reflects some pressure from JOB to "get something out".

Perhaps this time around it would make more sense for us to co-ordinate our responses to the draft, as we were in substantial agreement last time. It may help get the points across (especially to jack) if we have no big differences of emphasis to leave loopholes open for trading us off against each other! So I propose to send you a draft of my comments before I send anything to Ilias or Jack. For now, I'll just let Ilias know that I've got the draft o.k. and am reading it carefully.

The basis problems still remain:

1. Overstatement about what is "detected" jet or counterjet.
2. Sample badly skewed from the start by the size selection to match the optical data.
3. Sample too small (and nbow have got the other data in hand, so even less reason for rushing it out, in my opinion).
4. Ambiguous identifications (now 3C356 has joined that camp!).

What he _has_ done is to look at the jet prominence statistics as I suggested last time, to clean up the data reduction section as suggested, and to look into the identification questions. Unfortunately there's still no discussion of the errors in the ID process or of their implications for this small sample.

I think both our colleagues may be missing the main "result" here in their enthusiasm for labeling things as jets and counterjets. One of the "predictions" of the unified scheme is that jets will be damn hard to find unambiguously in radio galaxies compared with the quasars (where we had a 100% detection rate using the BP criteria, though 2 of 12 cases were only _just_ inside the 4:1 ratio). It's the very ambiguity of most of these 5 cases that _is_ the "result" (in my view). This still seems not to have sunk in, though even with their numbers you can see the jet prominence effect that I included in my Md talk from the "all jets" sample.

Anyway, take a good look at the big issues on this one, and let's try to get back to Ilias some time next week? I'll send you a detailed draft of my comments early in the week.

Cheers, A.

From root Tue Feb 11 10:20:28 1992
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
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"rperley@zia.AOC.NRAO.EDU " "<9202111520.AA17998@zia.aoc.nrao.edu>" "20" "Comments"
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id AA08060; Tue, 11 Feb 92 10:20:26 -0500
Received: by zia.aoc.nrao.edu (4.1/SMI-DDN)
id AA17998; Tue, 11 Feb 92 08:20:52 MST
Message-Id: <9202111520.AA17998@zia.aoc.nrao.edu>
From: rperley@zia.AOC.NRAO.EDU (Rick Perley)
To: abridle@zia.aoc.nrao.edu
Subject: Comments
Date: Tue, 11 Feb 92 08:20:52 MST

I was typing my comments onthe paper last night when the modem disconnected abruptly, so all was lost. I was so bummed out I went back to watching the Olympics.

I left the paper at home, so can't send you a list of detailed comments. However, I can say that your comments concerning the actual content of the paper very mild, in comparison to what I was thinking when I went through it. The claims made are simply totally unjustified! It's quite outrageous what these guys have done. Were I the referee of this paper, I'd shred it microscopic particles.

I'll go home at lunch and recover the paper, so that I can specify at length just which parts are so offensive.

Ilias sent me an e-mail yesterday, asking for fast turnaround. I presume we'll get this done today?

Subject #2: The Jodrell meeting. Patrick tells me we should get in the registration form, etc. soon. This means a title too. We can do a poster or a paper. Any preferences? I guess a title along the lines of `shocks and magnetic fields in the jet of 3C219' would do.

Rick

From root Wed Feb 12 03:52:42 1992
From: rperley@zia.AOC.NRAO.EDU (Rick Perley)
To: abridle@zia.aoc.nrao.edu
Subject: My comments on Ilias' latest draft
Date: Wed, 12 Feb 92 01:53:03 MST

Good morning. Insomnia (which strikes me quite often) can be useful. I'm going to use the current occurance to set down my basic problems with the Fernini et al. paper.

As I said yesterday, the basic problem is that Ilias and Jack are bound and determined to find counterjets and to derive results from these 'findings' despite the absence of any real evidence. There is in my opinion only one discovered jet here, and no counterjets. Period. As you have noted, this low detection rate, compared to QSRs, is itself useful and interesting. And I think the paper should only go about that far.

A few details:

1) The Introduction is rather weak. It does not convince the reader that the author has mastered the subject.

2) The selection criteria, especially the upper limit, and the use of the optical subset have, or might have, (respectively) introduced dangerous biases. This subject I needn't lecture you about!

3) There are many, many imprecise statements littered throughout. Things like 'well aligned', without any description of what this means (p. 10), and 'somewhat resembles' (p 12).

4) a specific note: on page 11, Ilias notes the jet polarization to be less than 4%, but this indicates the jet must have been detected with about 25:1 SNR (assuming the polarized and I noises about equal). Yet the image shows no such DR. How did he get such a low limit?

5) The common discrepancies between radio and optical cores is rather worrisome.

6) Many references to depolarization are made, with results discussed. Yet no data are presented, and the reader is referenced to an unwritten article. Bad Form!

7) The 'minimum' and 'maximum' flux densities for jets (p 17) are predicated on the very dubious identifications proposed by Ilias. Especially ludicrous is the 'minimum'! In my view, the 'maximum' for all but one of these sources would be given by the rms noise multiplied by the best-guess solid angle of one jet.

8) the K-S test result on p 18 could be gotten without recourse to the dubious methods mentioned above.

9) The word 'closer' on p 20 confuses physical closeness with angular closeness.

10) To my mind, the summary on p 21/22 is the nadir of the paper. In stating that the 6 radio galaxies satisfy at least 3 of the following criteria, he has stretched the truth way too far! In my view,

point (i) is always true to some level in every object
point (ii) is based on one source (maybe 2, including Garrington's)
point (iii) is based on results not shown
point (iv) is based on two objects.

And the sentence at the end of these points left me speechless!

11) I was dismayed to see Ilias still holding onto his optical depth argument. With the parameters given (which assume a filling factor of 1!) would mean that NO radio source with line emission would show any bridge or lobe emission at 20cm or lower. I think a quick perusal of the data will show that many r.g. with line emission also have straight low-frequency spectral, and lots of bright bridge emission. Also, Ilias fails (again) to tell us what frqeuency his eq (1) is calculated for, or indeed to note that the absorption is HIGHLY frequency dependent. Note that on page 23, Ilias calculates a filling factor of 10**-6, which if applied to his absorption argument will eliminate this effect.

12) p 25, more mushy statements: 'may favor', and 'sometimes observed'.

13) The last sentence (before the acknowledgements) confused me greatly.

In summary, if athe paper is published as it is now, we'll be laughed off the planet. It's time to put our foot down!

Rick

From abridle Tue Feb 18 13:01:45 1992
X-VM-v5-Data: ([nil nil nil nil nil nil t nil nil]
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Message-Id: <9202181801.AA23551@polaris.cv.nrao.edu>
References: <9202172234.AA04018@NMSU.Edu>
From: abridle (Alan Bridle)
To: ifernini@NMSU.Edu
Subject: Re: RGs Paper
Date: Tue, 18 Feb 92 13:01:32 -0500

Ilias, here are my comments on the RG paper second draft.

The minor corrections and additions made to the last version are mostly fine. As often happens, making one set of such changes reveals another layer that is needed. So I have again got some detailed suggestions that I will send to you via the ordinary mail.

But much more important this time are the *major* points that are still unanswered from the previous version. I agree completely with Rick that this paper is simply "not ready for prime time", for the following reasons.

1. The sample is biased towards small sources. Although it is intenesting to have the comparison with the optical data, it is most unfortunate that the radio data now cover a sample that could not be an unbiased version of the quasars at large inclination angles. I can think of only two ways to deal with this. One is to observe enough further RG's to correct the bias. (We should do this, but it's obviously got a *very* long time scale). The other is to estimate and discuss the consequences of the existing bias for the comparisons made in this paper. I do not think it is satisfactory simply to say, as the paper now in effect does, "we defined an unbiased sample very carefully, then we botched it up by selecting a biassed subgroup from it because we were interested in comparisons with some optical data". The effects of the bias must at least be modeled and discussed. I suspect that the results would have been much stronger without this bias, and maybe this case can be made.

2. The optical identifications remain in sad shape. Three of the five are now debatable, leaving only a sample of two that can be used safely. Possibly, for 3C 55 and 3C 324, this is just the result of inaccurate optical positions, and these sources could be rehabilitated back into the sample by getting decent optical positions. But until this is done, use of these sources is highly questionable. 3C 356, with galaxies under both small-diameter components, is now a lost cause. There is no unambiguous way to decide which of these is associated with the large-scale structure until there is an image deep enough to reveal which, if either, of these is connected to the lobes by a jet.

3. The paper still makes far too much of ambiguous and low-quality claims to jethood and counter-jethood. Although this version has gone in the right direction relative to the previous one, I found on reading it that it still obscures the main interesting result, which is that *unambiguous* jets (meeting the BP criteria) were found in *every* case in the quasar sample, and in only one (3C 22) in this sample. I

think that in its eagerness to say which lobe is the jetted lobe and to get "jet numbers" for the statistics, this paper is not properly dubious about the ambiguous cases. 3C55 is a case in point. The "conceivable jet" features are sufficiently disparate in their shape and polarization structure to raise severe doubts about whether they comprise a jet. Although the counter-indications are all mentioned somewhere in the text, the paper still sails on as if this "jet" was above reproach. It shouldn't.

The "counterjet" cases are even worse. 3C22 is marginal because of the well-known phenomenon of "lobe edge brightening". The possibility of confusion with lobe edge brightening or lobe filaments at this marginal resolution must be mentioned, and the 3C22 case downplayed because of it. The 3C324 case is too weak to be worth mentioning. There is at best marginal evidence for a jet, and no evidence at all for a counterjet.

4. The quasar paper has not been static while this paper was being worked on. When Colin visited me last December, it became clear that the main problem we were having with jet definition (even in the cases where the *existence* of a jet is absolutely clear) was really a problem in *hot spot* definition. Because of this, the quasar paper is now attempting to make a new, careful, definition of a "hot spot" that will make the specification of the "jet" features unique. I sent you and Jack a copy of this revised section of the paper, with the detailed consequences for the quasar cases.

   I think it is essential to have your comments on this before we proceed here. Unless there are serious objections to this new approach, we will use it in the quasar paper and some of the data that will appear there will therefore not be the ones that you are quoting here. It will not be more than about a day's work to adopt this definition if you agree with it, so I would recommend doing that rather than ignoring it as at, present which will lead to inconsistencies in the analysis.

5. The sample is too small. Now that we have the second set of data in hand, surely it is better to put it all together. (This still does not deal with problem #1, but it would allow the identifications that remain dubious to be thrown out (problem #2) and would also allow time for dealing properly with problem #4. The effects of "dubious jets" such as 3C55 would also be proportionally smaller if that source can be kept in the sample by an improved optical position for the galaxy.

6. I don't understand what's going on with the filling factors in Section VI.2. Surely we can only get counterjet "hiding" by the free-free absorption if the filling factor is close to unity, whereas in fact all the evidence suggests that the filling factors are tiny? I agree with Rick's comments on this section, unless you can point out what we are both missing.

Now my main point is that I feel that all of these prodlems add up to a *big* set of reasons not to go forward with this paper in its present format. I think there is an interesting result suggested here, that (if it it can be confirmed in a larger, unbiassed sample) has some implications for the unified models. It is that JETS ARE LESS PROMINENT AND THEREFORE HARDER TO IDENTIFY IN RADIO GALAXIES THAN IN QUASARS. If we had a sample that was not biased out of the plane of the sky, then we might be able to go on and ask whether the counterjets were approaching the (low) prominence of the main jets. But in fact we have (a) a sample

that is probably biased away from this asymptotic equality by the size selection in the optical data and (b) a sample in which no counterjet has been detected plausibly. I think it is therefore a big mistake to be make more of the counterjets than is there, despite the original intentions of this study!

I believe that the "rescuable" part of this paper is along the lines of:

"Despite the residual orientation bias, the unified models would predict that such a sample of radio galaxies is closer to the plane of the sky on average than the quasar sample. It would therefore predict that this sample should have less prominent jets relative to their lobes than in the quasar sample. We do see some evidence for this effect."

If this result stands up, with the *whole* sample, we may have something worth publishing.

But for this paper as it stands, I believe there are too many problems for it to be worth publishing.

I will send you my detailed comments anyway, but these major ones simply must be addressed before we go any further.

From abridle Wed Feb 19 10:32:33 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
      ["533" "Wed" "19" "February" "92" "10:32:22" "-0500" "Alan Bridle" "abridle "
nil "10" "Changes to paper" "^From:" nil nil "2"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA26874; Wed, 19 Feb 92 10:32:22 -0500
Message-Id: <9202191532.AA26874@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: rperley
Subject: Changes to paper
Date: Wed, 19 Feb 92 10:32:22 -0500

I've offered to Ilias to make a round of changes to the paper if I can
have the .TEX file to work on. But the biggest points remain, and I guess
these are what we will have to discuss over the phone with him.

Ilias told me he had already heard from you. Was that with the full
comments that you sent to me? If not, I should forward those to him also.
I got behind on this as I had a bad cold for a few dayw and did not get to
it as quickly as I had hoped. This may have put us out of synch.

Sorry if there is confusion here

From root Wed Feb 19 10:48:15 1992
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
["274" "Wed" "19" "February" "92" "08:48:35" "MST" "ifernini@NMSU.Edu"
"ifernini@NMSU.Edu" "<9202191548.AA15782@NMSU.Edu>" "8" "Re: english changes"
"^From:" nil nil "2"])
Received: from opus.NMSU.Edu by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA27058; Wed, 19 Feb 92 10:48:14 -0500
Received: from charon (charon.NMSU.Edu) by NMSU.Edu (4.1/NMSU-1.18)
id AA15782; Wed, 19 Feb 92 08:48:35 MST
Message-Id: <9202191548.AA15782@NMSU.Edu>
Received: by charon (4.1/NMSU)
id AA21992; Wed, 19 Feb 92 08:48:34 MST
From: ifernini@NMSU.Edu
To: abridle@polaris.cv.nrao.edu
Subject: Re: english changes
Date: Wed, 19 Feb 92 08:48:35 MST

Hi Alan,

You are welcomed to do so. The telnet # for our machine is 128.123.26.2.
You have to login under the username ifernini, password mrabea. The tex
file is in the directory TEX and the filename is paper.tex. Please let
me knowuonce you are done with the ftp.

Ilias

From abridle Thu Feb 20 17:43:15 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
      ["1228" "Thu" "20" "February" "92" "17:43:10" "-0500" "Alan Bridle" "abridle
" nil "34" "Hacked .TEX file" "^From:" nil nil "2"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA14792; Thu, 20 Feb 92 17:43:10 -0500
Message-Id: <9202202243.AA14792@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: ifernini@nmsu.edu
Subject: Hacked .TEX file
Date: Thu, 20 Feb 92 17:43:10 -0500

Hello Ilias,

I've just put back in your /TEX directory a hacked file called rgs.tex
that contains a quick pass across your file with my suggestions and
corrections.

I'm using the TeX comment facility to comment out sections of the
old text that I think should be dropped or put in Tables. Lines
starting with a % are your old text that can be reinstated by
just deleting the %.

Lines starting in % -- are now my comments to you about why I'm
suggesting changes, or to draw attention to things that I think
still need to be done or to be discussed. If you search rgs.tex
on % -- you'll get a quick look at these points, which are in
more detail than my E-mail.

I've basically dropped ouff anything that I think is marginal
or ambiguous. On reading the result through, I have an overwhelming
feeling that there's not enough left in this to make a stand-alone
paper that will do your career or the world any good. This is what
we should really discuss tomorrow.

I think we have three possibilities:

1) carry on, but make this a very low-key, short paper
2) merge this with the other 6 objects
3) merge this with the depolarization paper that you and
   Jack are planning on these 5.

Talk to you tomorrow am,

Alan

From abridle Fri Feb 21 12:14:54 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
      ["295" "Fri" "21" "February" "92" "12:14:50" "-0500" "Alan Bridle" "abridle "
nil "7" "Abstract, Title and references" "^From:"
 nil nil "2"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA02076; Fri, 21 Feb 92 12:14:50 -0500
Message-Id: <9202211714.AA02076@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: ifernini@nmsu.edu
Subject: Abstract, Title and references
Date: Fri, 21 Feb 92 12:14:50 -0500

I've put these files back in your /TEX area as newpaper1.abs, newpaper1.tit and newpaper1.refs. Only small changes to each, but hope these are helpful.

I'm glad we have agreed on how to proceed from here, and hope the rest of your time here is not too frantic as a result!

Best wishes, Alan

From root Fri Feb 21 13:18:58 1992
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
["950" "Fri" "21" "February" "92" "11:19:13" "MST" "ifernini@NMSU.Edu"
"ifernini@NMSU.Edu" "<9202211819.AA22128@NMSU.Edu>" "20" "Re: Abstract, Title and
references" "^From:" nil nil "2"])
Received: from opus.NMSU.Edu by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA16466; Fri, 21 Feb 92 13:18:54 -0500
Received: from charon (charon.NMSU.Edu) by NMSU.Edu (4.1/NMSU-1.18)
id AA22128; Fri, 21 Feb 92 11:19:13 MST
Message-Id: <9202211819.AA22128@NMSU.Edu>
Received: by charon (4.1/NMSU)
id AA05067; Fri, 21 Feb 92 11:19:13 MST
From: ifernini@NMSU.Edu
To: abridle@polaris.cv.nrao.edu
Cc: ifernini@NMSU.Edu
Subject: Re: Abstract, Title and references
Date: Fri, 21 Feb 92 11:19:13 MST

I have to thank you for all of your fruitfull comments. I hope that the new paper won't raise too much objection. I$will just present the radio observations without further arguing about the jet/counterjet issue.

About the new observations: I have now completely calibrated the data, for both A and B arrays. Now, our sample contains 13 RGs plus 3C 352 from Garrington. You can have a grasp at this sample by looking into the directory /TEX/thesis/rgs.tex to read the tex file. I took the time

(sorry about skipping lines) to preliminary reduce some data, especially for 3C 325 and 3C 441. I went through several self-calibration for both of them and without doubt in mind, we have a jet in each source. I do not recall if these jets have been seen before or not. I do not know if you have such information with you. In any case, I will be now working on the new paper, and I will let you know when you can ftp it.

With best regards,

Ilias

From abridle Fri Feb 21 13:52:32 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
["549" "Fri" "21" "February" "92" "13:52:24" "-0500" "Alan Bridle" "abridle "
nil "10" "Re: Abstract, Title and references" "^From:" nil nil "2"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA23795; Fri, 21 Feb 92 13:52:24 -0500
Message-Id: <9202211852.AA23795@polaris.cv.nrao.edu>
References: <9202211819.AA22128@NMSU.Edu>
From: abridle (Alan Bridle)
To: ifernini@NMSU.Edu
Subject: Re: Abstract, Title and references
Date: Fri, 21 Feb 92 13:52:24 -0500

3C325 was not previously known to me, but 3C441 was characterized as
a possib;e, but not confirmed, jet on the basis of an old image by
Robert Laing. This shows an elongated knot at the base of what might
otherwise be a possible lobe-edge filament going into a compact,
recessed hot spot in the NW lobe. The knot appears somewhat elongated
on Laing's image but does not quite meet the 4:1 criteria. If we
have slightly better dynamic range than he did, we may be able to move
that one from the "possible" to the "confirmed" category I guess.

A.

From abridle Fri Jun 5 17:30:03 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
      ["11147" "Fri" "5" "June" "92" "17:29:51" "-0400" "Alan Bridle" "abridle "
nil "226" "Comments on redraft" "^From:" nil nil "6"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA15415; Fri, 5 Jun 92 17:29:51 -0400
Message-Id: <9206052129.AA15415@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: jburns@nmsu.edu, rperley
Subject: Comments on redraft
Date: Fri, 5 Jun 92 17:29:51 -0400

Title Page. Rick doesn't live in Charlottesville

NRAO-CV address is 520 Edgemont Road, VA 22903-2475

p.6 Sec.2, line 4
delete "and will be presented in a future paper", we've already said this is just the first round results.

p.7 Sec.2, line 1
"The five radio galaxies were observed in the A and B configurations at 6cm."

p.8 Sec.2, last para:
"The NRAO AIPS software was used to calibrate the data. For the 20cm data, ionospheric Faraday rotation introduces significant errors into the apparent E-vector position angles. The ionospheric rotation at 20cm was corrected using a model based on observed electron densities, with the AIPS task FARAD."

p.9 line 3 from end:
"... data from the two IFs were combined before the images were CLEANed."

p.10 line 1:
"The images are limited by confusion rather than by thermal noise."

3C22, para. 2:
"Figure 2a shows contours of total intensity at 0.35" resolution. Several significant new features can be seen. A compact "core" is now detected between the two extended lobes. Its 7.2-mJy peak intensity is at \alpha (B1950) 00h 48m 04s.731, \delta (B1950) 50... etc.

****
N.B. the position epoch should be quoted explicity, as in the above. Either we say somewhere early on that all positions in the paper are in B1950 or we should give this qualification to all positions, I don't mind which. As we're using \delta for declination elsewhere (p.5) why not be consistent and use \alpha and \delta for the co-ords here, rather than R.A. and DEC ?

p.12 line 6
delete "from the combined A and B configuration data" (it's

in the Figure caption and in the Tables, too)

(also make same change pages 13, 14, and 16).

p.15 line 3 from end.
replace "we will note" by "we show"

p.17 Replace first paragraph:

V. DEPOLARIZATION

A further goal of this study is to examine the depolarization asymmetries of 3CR radio galaxies, for comparison with the known properties of quasars and with the predictions of unified models such as Barthel's. (If quasars are systematically oriented closer to the line of sight than radio galaxies, but are surrounded by similar, symmetric, magnetoionic media we may expect to see smaller lobe-to-lobe depolarization asymmetries in radio galaxies than in quasars). Because our three-frequency polarization data were taken only in the B configuration, images made from the untapered data have different resolutions, \approx 0.7" at 3.6cm, \approx 1.1" at 6cm and \approx 4.0" at 20cm. We have therefore tapered the (u,v) data to obtain similar resolutions of 1.1" at 3.6 cm and 6cm, and of 4" at 6cm and 20cm. The images made from these tapered data cannot be expected to measure small depolarization differences reliably, as they have differing sensitivities to large and small scale structures at the two frequencies despite the similarity of beamshapes obtained by the tapering. They should, however, be adequate to give a preliminary indication of any gross depolarization asymmetries across these sources.

First sentence of next paragraph:

"We define the depolarization ratio, DP, as the ratio of ...."

p.18 para.3

"The compilation of Tabara and Inoue (1980) estimates half-depolarization wavelengths of 17cm for 3C356, 23 cm for 3C324, >21 cm for 3C22 and 3C55, and >31 cm for 3C265. Our data (Table 6) are in good general agreement with Tabare and Inoue's conclusions from the integrated polarimetry. None of the five sources shows significant depolarization between 3.6 and 6cm, whereas both sides of 3C356 and one side of both 3C324 and 3C22 appear significantly depolarized between 6cm and 20cm. For 3C22, we can definitively say that the side that depolarizes most rapidly is that with the fainter, or counter, jet. For 3C324, the depolarization asymmetry is also significant, but we have found no firm evidence for either a jet or a counterjet and so cannot correlate it with the asymmetry of the jets. For 3C356, the depolarization appears to be significant in both lobes but is symmetric to within the errors; we again have no evidence for either jet or counterjet in this source."

****

N.B. Table 6 still labels the lobes "Jet" and "CounterJet"! For all but 3C22, this is an unacceptable holdover from the earlier versions of the paper in which jets were being claimed on very little evidence, and must be changed, e.g. to East/West, Preceding/Following or some other purely positional descriptor. There's also a floating "3C356" in the

table caption, after the first sentence.

p.18 last para (goes onto p.19)

As there are 40 QSRs in the Garrington et al. 1991 sample it seems to me to be very odd to compare with just 3C47. What's special about that except that Ilias observed it? I've plotted up the depolarization ratios from G et al. in various ways to look at the relation of our five to them, and of the RGs to the QSRs in general. An interesting plot to make (not done in G et al.) is the DP asymmetry vs. redshift, which shows a very strong trend. I don't know, and it doesn't matter for the moment, whether this is really a z-dependence or a P-dependence, but what is clear is that if you compare the G et al. QSRs and RGs in the same redshift range there's no significant difference in the statistics of their depolarization asymmetries (the higher DP ratios are all attached to QSRs with z>1.2 and the very highest ones are all at z>2). If you plot the ratios for the 5 we've just measured (taking the ratio of the less-depolarized to more-depolarized side rather than the jetted to counterjetted, which we don't know explicitly), they lie in the same part of the diagram as the G et al. RG's and the G et al. low-z QSRs. I therefore see no evidence that the DP ratios for *comparable* RGs and QSRs are different, and it may be better to point this out on p.19 top para. than to waffle about possible orientation diagnostics as in the present text. I'll FAX the plot I've done if you want to pick up on this topic.

p.19, last para.

"We re-examined the radio-optical relationships by overlaying the new radio images on the optical emission-line images from McCarthy 1988)."

(I see no reason to say we did it carefully, as nobody will be presuming that we did it in a slapdash fashion while blind drunk on a Saturday night).

Now: where are these superpositions or the emission images, ** published** ? It's not much help to the reader who wants to evaluate the conclusions if the only places they can be verified are the references we give - McCarthy 1988 and fernini 1991, as these are unpublished theses. This is the motivator for putting the superpositions in the paper, except that they (as represented in the thesis) are rather ugly-looking. For example, **who** said 3C22 line region is unresolved? McCarthy? Fernini? It doesn't **look** unresolved on the superposition, but maybe the extended bits are artefacts? I think we need some reference for the statement that it's unresolved, or we need to let the reader assess the credibilibity of the flat, unattributed, statement that it is unresolved. Jack says in his memo that he's worried about the paper being too long, but right now the statements about the optical-radio comparison are unverifiable and I think that's something to worry about.

p.21, para. 2

I presented the statistics of prominence of detected jets in a large sample of RGs and QSRs at the Maryland AGN meeting (Fig.2 in my review) which is now published, showing that the RG jet prominence systematically decline with power while the QSR jet prominence range all over the map in the same power range (the least prominent QSR jets overlapping the

range of the RG jets and tending to be in the larger QSRs). So can we amend the last sentence of the middle para to read:

"The much lower incidence of detectable jets in this sample of radio galaxies is braodly consistent with the RG/QSR unification scheme proposed by Bathel (1989) and with the trends of jet-to-lobe prominence in a larger sample of RG's and QSRs at these powers derived by Bridle (1992)."

We can expand on the latter if you wish to make it more explicit, but I'd just like this paper to acknowledge, as a minimum, that other data in this area do exist and have been published.

p.21, third para.

"Section V showed that there is little depolarization in these five radio galaxies as the wavelength increases from 3.6 to 6cm, but three (3C22, 3C324 and 3C356) show significant depolarization between 6cm and 20cm. This depolarization is asymmetric in 3C22 and 3C324. In 3C22, the only
case where we have detected an unambiguous radio jet, the jetted lobe is the less depolarized at 20cm."

"Section VI used our improved images to confirm the result of McCarthy et al. (1987, 1991) that,
in sources in which the extended optical emission line system is markedly asymmetric, the excess gas favors the shorter side of the radio source. This suggests that the separation asymmetry of the lobes may be related to an asymmetry in the ambient gas density which slows the development of one lobe relative to the other. There is no evidence from our data however for any further correlation between the emission line asymmetries and jet sidedness or depolarization asymmetries."

p.22, last para. of paper.

"Subsequent papers will present the VLA data on the other sources in Table 1, and will compare the core, jet and lobe properties of this radio galaxy sample with those of the quasars from Bridle et al. (1992)."

Acknowledgements.

"We thank the NRAO AIPS group for the software used in the data reduction and analysis, and Drs. J.P.leahy and P.J.McCarthy for providing us with their VLA data".

References.

need to be put into proper format (2nd lines idented for clarity).
Fomalont and Perley ref, delete "by" after "eds."
I haven't checked the journal refs. yet. Has anyone else?

That's all for this week. I'll check the Fig Caps as soon as I can on Monday.

It's better, though it's still flimsy and in many ways I'd prefer to wait for the rest of the data. But I guess Ilias needs the extra publication, whatever it's weight, to keep the Saudis happy?

From abridle Tue Jun 2 09:10:09 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
      ["832" "Tue" "2" "June" "92" "09:10:06" "-0400" "Alan Bridle" "abridle " nil
"17" "Opt emission line images" "^From:" nil nil "6"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA23805; Tue, 2 Jun 92 09:10:06 -0400
Message-Id: <9206021310.AA23805@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: rperley
Subject: Opt emission line images
Date: Tue, 2 Jun 92 09:10:06 -0400

Re Jack's comments on the emission line images in the revised version of
our paper -- are they available anywhere except in McCarthy's and in
Ilias' theses? There's no publication reference given. I'm wondering
particularly wherm the statement about the 3C22 emission line system being
unresolved comes from. It doesn't look unresolved in Ilias' thesis, but
has quite a bit of apparent substructure (unless this is all artifacts).

Seems to me it would help the reader to be able to see these comparisons,
especially if the alternative is to refer to one of two unpublished
theses and if the visual appearance of the data differs from the word-
descriptions.

The only argument against using the superpositions out of Ilias' thesis
seems to me to be that they are not particularly pretty. But I do think
they are useful.

A.

From root Tue Jun 30 11:44:08 1992
From: rperley@sechelt.AOC.NRAO.EDU (Rick Perley)
To: jburns@nmsu.edu
Cc: abridle@sechelt.aoc.nrao.edu
Subject: Comments on latest draft of Fernini paper
Date: Tue, 30 Jun 92 09:49:18 MDT

Hi Jack 0! I have gone over the paper, here are the results.

Overall, I'm fairly happy with the paper. There are a number of small, almost picky, comments, but no major ones. I think the claims being made now are reasonably and supportable. This is not a ground-breaking paper, but is good enough to be published.

1) Title Page. My address is wrong. (Also, I usually prefer to go by my initials, but it is more important that all four authors be identified the same way. If you and Ilias want your first names spelled out, then I will too.)
2) page 3. I should think that of the two motivating studies which preceded this work, the Barthel paper, and its predecessors, should be identified first. The Bridle et al paper (1992) would, in my view, be ranked second (even if the proposal preceeded the Barthel work). My reasoning is that the Barthel paper proposes a clear, testable model (not for the first time, incidentally, Alan and I had stated essentially the same idea in our 1984 review), which has generated much attention and plenty of observing. The QSR study of Bridle et al. can be considered one of many detailed studies, and the current paper is another.
3) page 3, 3rd and 4th lines from bottom. The term 'radio galaxies' is mentioned twice, in different meaning, from what has earlier been defined. Earlier in this paragraph, radio galaxies are defined as 'unbeamed' quasars, while here, they are considered to be the general class, from which quasars are drawn. I suggest we define the overall class as 'luminous extragalactic radio sources', so we can call quasars those which are beamed, and oriented near the the line of sight, and radio galaxies as those which are not.
4) page 4, top. The Barthel model presupposes that jets are relativistic. We should probably mention this specifically.
5) page 4, line 6. We drop the Laing-Garrington effect in without introduction and explanation. A few words more here might be helpful.

Sections II and III. I have few comments here. I suggest, though, that if length is a problem, we whack down section III significantly. The process of calibration, self-calibration, etc., is now so familiar, we shouldn't have to go into this level of detail.

6) p7, section (iii). The bandwidth reduction quoted is, strictly speaking, for a point source.
7) p7, bottom, and in numerous other places. At the risk of being pedantic and boring, I will repeat my complaint against use of the word 'array', when 'configuration' is what is really meant! (I promise not to bother you again with this one).
8) p9, middle. AHA! You used 'Configuration' here! Congratulations.
9) p13, and in numerous other places. Why is the word 'core' repeatedly surrounded by parentheses? It's ugly. If suggestive language is the problem, I suggest we define our interpretation of the word 'core' in the introduction, along with 'lobe', 'jet', and 'hot spot'. If 'core' is to be paren'ed, we should do the same with all those other words. We can escape all of this with a short, defining paragraph, in the intro.
10) p13, bottom. Do the POSS show anything under central feature D?

11) p16, middle. Usually, the spectrum of a compact feature will tell us what is a core. Object D appears to have a steeply inverted spectrum (judging from the published maps), so would be my candidate. Note that I am not accepting what the paper suggests -- that both knots are cores. I'm betting that E is a jet knot, which happens to lie upon a galaxy image. Low probability, possibly. Your conclusion is right -- a real jet will likely have to be found to be really sure. But, what are the spectra of the two knots? Perhaps E has a steep spectrum.
12) Equation 1. You have (wavelength squared) in both numerator and denominator. It should be just the ratio of the fractional polarization at the two wavelengths. Since later uses of DP have the two wavelengths attached, you should perhaps attach them to the definition as well.
13) p18, middle paragraph. This confused me. I presume, in the 5th line of this paragraph, you meant 'I and P maps', not 'I and p maps'. Presuming this, I am a little wary of calculating the mean DP in this way, for this heavily weights the brightest areas (both in I and P). This results in an intensity weighted depolarization, whereas an area-weighted one is probably more meaningful. Given the poor SNR, your perhaps have little choice, but I'd feel better if you blanked the p maps at, say, 5 sigma (or even more), then averaged over them.
14) p19, top. The Laing and Garrington papers deal (almost entirely, Ithink) with QSRs. This is an important note, and should be mentioned when you are comparing the RG DPs to Laing and Garrington. Mentioning this will also help deflect criticism that you are singling out 3C47 for comparison.
15) p20, middle. The word 'excess' is (a) I think inappropriate here, and (b) is repeated twice in the same line (7). How about 'asymmetry'. 'Excess' implies too much (like in eating, oink, oink), while asymmetry is a prettier, more meaningful word, especially in this context.
16) p21, top. Nucleus of 3C356, same point as (11), above.

O.K., That's it.

Rick

COLLEGE OF ARTS AND SCIENCES

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Las Cruces, New Mexico 88003-0001
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JULY 22, 1992

NEW MEXICO STATE UNIVERSITY

TO: ILIAS, ALAN, & RICK

FROM: JACK

SUBJECT: REVISION OF RADIO GALAXIES PAPER

Please find enclosed another substantially revised draft of our radio galaxies paper. I have attempted to address each of your comments from the last draft. The changes include:

(1) A new Figure 1. This figure was produced using some newly acquired software (Spyglass, Adobe Printshop) running on a Mac II which drove a new $20k Kodak photographic printer here at our NMSU visualization center. We were able to control the contrast and transfer function on each image while mosaicing the 5 maps. The final dynamic range looks pretty good. I tried to emphasize those important features in each map which could not be clearly seen on the contour maps. I'm particularly interested in Alan's reaction to this figure with regard to possibly using this camera for the QSO greyscale images.

(2) The introduction has been reorganized per Rick's suggestions.

(3) Section 3 was cut back by nearly a factor of 2.

(4) A new section, 4.1, was added which defines core, jet, lobe, and hot spot in a manner consistent with that used in the QSO paper. I tried to then follow these definitions carefully in the remainder of the paper. In particular, I reviewed the source structures and made appropriate flux density and size measurements of components to be sure that our descriptions matched the definitions. As a result, some revising of Section 4.2 was necessary.

(5) Rick suggested that we look at the spectral index of features D and E in 3C 356. In doing so, I found that D is flat but E has a rather steep spectrum. As a result, one must be suspicious about E as the optical ID. This is discussed in Section 4.2.5.

(6) Alan asked who says the [OII] line emission in 3C 22 is unresolved. McCarthy stated this in this thesis and described the northern extensions as "artifacts". This is now noted in Section 6. Also, in response to Alan's request, I have included a new figure (Fig. 7) from Ilias' thesis that has the overlays of the optical emission line images onto the radio.

There are many other little changes to the text, tables, references, and figure captions as you will see. Please read over this latest version very carefully and give me your comments. I would like this to be the final round of internal review before submission. I will take your comments, revise the paper again, and then submit it to the Astronomical Journal. If possible, I'd like to do this by the end of August, so I'll need your comments as soon as you can get them to me.

Thanks very much for all your help.

From abridle Mon Aug 17 17:10:19 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
      ["246" "Mon" "17" "August" "92" "17:10:14" "-0400" "Alan Bridle" "abridle "
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          id AA26936; Mon, 17 Aug 92 17:10:14 -0400
Message-Id: <9208172110.AA26936@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: jburns@nmsu.edu
Subject: RG paper
Date: Mon, 17 Aug 92 17:10:14 -0400

I've just get to the pile of paper mail awaiting my return from vacation,
and with it your redraft of the RG paper. Will look at this and send
comments asap. Will be a few days owing to pileup of stuff here during
my 3 weeks away.

Cheers, A.

From abridle Thu Aug 27 18:27:27 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
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nil "7" "reference" "^From:" nil nil "8"])
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          id AA35094; Thu, 27 Aug 92 18:27:05 -0400
Message-Id: <9208272227.AA35094@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: jburns@nmsu.edu
Subject: reference
Date: Thu, 27 Aug 92 18:27:05 -0400

Here's the reference you were asking for to my review article:

Bridle, A.H. (1992), in "Testing the AGN Paradigm", eds. S.S.Holt, S.G.Neff
and C.M.Urry, AIP Conference Proceedings No. 254, p.386-397

From root Thu Aug 27 18:09:37 1992
From: Rick Perley <rperley@aoc.nrao.edu>
To: jburns@nmsu.edu
Cc: abridle
Subject: Here they are:
Date: Thu, 27 Aug 92 16:09:32 MDT

O.K. Jack. I've been through the 'final' version, and have lots of comments, all of which are, I think, minor.

Section I. Introduction.

1) I don't think we need to mention the 'other models', referred to in the third sentence. These are mostly of historical interest, and the link between them and the current ('Barthel') model is not clear at all in the text. What we are interested in is testing predictions made by the 'Barthel' scheme. Referencing back to old ideas adds nothing to this paper.

agreed.

2) The last sentence in the first paragraph implies that the model has something to say about relative prominence of hotspots, and lobes. Really! I don't think the scheme predicts anything at all about lobes and hotspots. Perhaps a reword here is in order.

3) I think the text at the beginning of Sec. 5 should be placed in Sec. 1. The first two paragraphs of the Introduction lay the basic picture, but in the current version, we wait until Sec. 5 to describe the second observations test (polarization asymmetries). Since we state the primary test (jet prominence/sidedness) in the introduction, I think we should also lay down the (de)polarization test there as well.

✓

4) page 5, second line. ... were recently observed, ... 'Recently' is a very relative, soft, term. Perhaps we should mention a real date -- even a month and year will be adequate.

✓

Section II, Source Selection.

1) The first phrase 'The 3CR radio galaxies...' doesn't say what we mean it to say. What we want is something like 'Our sample of 3CR radio galaxies ...'

✓

2) Third line, first paragraph. 'Basically identical' -- another undefinable term. How about 'statistically identical' ? (Down with Colloquiallisms!)

✓

3) Selection Criteria... Was the selection in redshift set in order to reduce the sample size? Or to match the redshift range of the QSR sample? We should probably state which (or both). Incidentally, why wasn't a luminosity criterion imposed instead? Presumably, the 10" minimum size criterion was imposed also to match the QSR sample?

✓

4) Section 2.2, fifth line. 'all sources', should presumably be 'all five sources'.

Section III, Observing and Imaging Techniques

First paragraph, section (iii). I think this should be reworded just a tad. Something like 'Used the bandwidths shown in Table 2. These values were selected to cause less than a 5% reduction in intensity due to chromatic aberration at outer edge of each object.' The current wording is tortuous and misleading. (Perhaps Alan can further improve on my attempt)

✓

2) The flux density of 3C286 is a factor of 1000 wrong! (p 7, second line from bottom).

✓

3) I suggest dropping the whole of the paragraph on top of page 8, and Table 3 as well. Who cares what the calibrators were, or what their flux densities or positions are? I don't, and I doubt a single reader out there gives a hoot. They need to be assured that we know how to calibrate, and that we did it correctly. That paragraph, and that table, don't do it! The procedures are boringly standard now.

— fonction of calibrators are relevant.

Section IV. The Images.

Congratulations on a brave attempt to do what nobody has done before -- define a hotspot! I have a couple of quibbles:

For (2) Jet, condition (c) 'aligned' with the nucleus. I would think that, since many jets are both aligned and curved, we might note that precise linear alignment is not necessary, but rather a 'plausible physical connection' be seen from the nucleus, through the jet candidate, to somewhere beyond.

For (3), I would vote that 'Lobes' exclude 'Hot Spots', as well. Thus, put 'Lobes" after 'Hot spots'. But I'll happily be voted (or shouted) down on this one.

For (4) 'Hot Spot', I'll note that conditions (a) and (c) are essentially the same. (Where did the factor of four come from?)

A couple of syntactical things: page 10, top paragraph, last line: 'No core or jet was detected'. (Not 'were'). And, last paragraph, first line, '...are fairly WELL aligned ...' (Missing word).

page 11, and elsewhere. When discussing brightnesses, I vote (strongly) that we adopt a standard unit of brightness, and use it whenever we have a well resolved object. I think the standard unit should be mJy/sq. arcsecond. (NOT mJy/beam). Is it possible to adopt this in our paper?

page 13, on 3C265, first paragraph, last line. 'Several Components...' It seems there are only two, A, and C.

page 15, 3C356, the famous pair of possible nuclei. Since we have three frequencies, it seems that we should be able to make as statement on which of our two nucleus candidates is the more plausiable, based on spectrm. (Of course, if they are both nuclei, this test will likely fail, but it seems worth mentioning, at least). I've raised this before, but I can't recall the answer.

Section V, Depolarization Analysis.

I've already stated my believe that the first paragraph should, at least in part, be put into the general introduction.

page 18, middle. When you say 'depolarizes most rapidly', you really mean 'depolarizes at a higher frequency' (Right?) Why not say it this way? 'rapidly' normally implies speed, not wavelength.

page 18, middle. We should state, in words, that 3C55 and 3C265 show now depolarization asymmetry over the wavelengths we used.

Section VI, Optical Emission etc.

Well now. IT's time to judge what is symmetric, and what is not. My first candidate for a false asymmetry is the [OII] emission from 3C265.

What I see when I look at the image is a wonderfully symmetric emission region centered on the galaxy, plus two (unresolved?) blobs, one above the radio source, one far beyond (to the E) the lobe. On the basis of this, I find it a little far-fetched to claim wonderous physical effects like explaining the lobe distance asymmetry (which is very small in this particular object). I WOULD be convinced if there was any reason to believe the OII emission was distributed everywhere around and beyond the radio lobes, and was CLEARLY more densely distributed on one side than the other. I don't see that here! (But maybe you do, and can explain this to me).

Beyond this, it's not clear if there should be any connection between a DP asymmetry and the presence (or absence) of [OII]. There Could be, but Should there be? Attempts to connect these phenomena (as stated on top of page 20) are rather like grasping at straws.

For 3C356, I will agree there is a strong OII asymmetry, but since

the asymmetry is located far from any radio emission (or at least, the region where the optical measurements were made is), it's rather hard to make any statement whatever about connections.

a questionable business indeed, this optical emission stuff.

Section VII. Discussion.

page 21, second line 'substantiate the proposed ids'. Is this the right word? Is 'confirm' better?

Second paragraph, middle. 'Qualitative result'. It seems that the detection rate ratios (1/5 vs 13/13) is pretty quantitative. The sensitivies are about the same, so perhaps we could drop or change the damning adjective 'qualitative'.

p 21, third paragraph. Probably, a few words to compare the DP results for these radio galaxies to that for qSRs should be put in (even if no difference can yet be discerned). I don't think we should be silent on this important question.

ANd FINALLY...

I can hardly wait to meet Linda XXX, (referenced in the acknowledgements). Does she have a sister, Brenda XXXX? Pretty risky stuff, there Jack.

I don't think I need to go through another round. Make what changes you think are appropriate, and let it go (if Alan agrees).

Rick

From root Thu Aug 27 18:13:36 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
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id AA21996; Thu, 27 Aug 92 18:13:21 -0400
Received: by sechelt.aoc.nrao.edu (4.1/1.3pmg)
id AA00499; Thu, 27 Aug 92 16:13:22 MDT
Message-Id: <9208272213.AA00499@sechelt.aoc.nrao.edu>
From: Rick Perley <rperley@aoc.nrao.edu>
To: abridle
Subject: DPR vs Red Shift
Date: Thu, 27 Aug 92 16:13:22 MDT

Alan: While going thru my notes on Burns/Fernini latest draft, out popped your plot of DP ratio vs. z. Very interesting, the dramatic rise of DPR vs. redshift.

I first thought this was a simple wavelength/redshift effect, but quickly realized this should work the other way, since the emitted wavelength is shorter than the received. So, what do you think is the basic cause of this dramatic effect? Is it the denser gas supposedly around higher redhift objects, or a resolution effect, due to their greater distance? Or something else?

Rick

From abridle Tue Sep 1 17:21:34 1992
From: abridle (Alan Bridle)
To: jburns@nmsu.edu, rperley
Subject: RG paper comments to come ...
Date: Tue, 1 Sep 92 17:21:18 -0400

Hello Jack and Rick,

In case you're wondering where I'm at in reading the RG paper draft, this is to let you know that I've gone through it once and have made some notes about things to do. I want to collect these together and send them to you both, probably some time tomorrow.

I think the science (what there is left of it!) is now in reasonable shape, and that we are indeed close to having the final draft. Jack's compression of the data reduction section has gone particularly well -- please use your text-compression skills on the QSR paper in equal measure, Jack!

The main points that bother me are:

(a) I'm not entirely happy with some of the language in the Introduction, especially as it is a tenet of unification that RG and QSR jets are *equally* beamed but that there is a systematic difference in the optical classification based only on orientation. The intro implies that QSRs are more beamed. I'll take a crack at rewriting this section this evening, and I will try to cover Rick's comments as well while I do this.

(b) It's not made clear enough which RG lobe features meet the new hot spot criterion from the QSR paper, as the term "bright spot" is still around in this text. Does everything that's called a "spot" in this text meet the numerical criteria for a "hot spot"? I think we should aim at this, and the confusing term "bright spot" shouldn't be used. The "core-lobe" distance needs to be defined for lobes that have nothing that meets the hot spot criterion. by the way. Note also that Robert has asked us for some reshaping of the hot spot criterion in his comments on the QSR paper. We will have to keep the 5% size limit, not his preferred 2%, but we'll go with his other new language in the QSR paper and should therefore use it here. Note also that Rick's problem with the "alignment" part of the jet criterion came about because you left out half of it -- the "where closest to it" clause!. I'll collect specifics re hot spots and lobes for tomorrow's message.

(c) When I saw your point about the spectral difference between 3C356D and 3C356E I had a flashback to a paper with Ed Fomalont aeons ago -- AJ, 83, 704 (1978) -- in which we discovered from the old NRAO-GB interferometer that there are two kinds of "cores" in extended RGs on arcsec scales -- compact with spectral index <0.4, and extended with spectral indices >0.4 and a spectrum-luminosity relation. So I looked (in vain) for what we say about resolution limits for our "cores" and for D and E in particular. Could we distinguish between the possibilities (a) that E is an SSC in the extended radio galaxy, (b) that it is an isolated CSS source? Your text implies "yes, it's more likely a CSS than an SSC", but I couldn't find the evidence. Maybe we need a table of central feature properties, including size limits?

(d) I disagree with Rick re the significance of quoting calibrator positions. I think we should keep them, especially as positional discordances with the identifications are an important part of the paper. There's no way a future reader can evaluate the possible systematic errors in

our positions unless we tell her how we referenced them. (Just like the flux densities and polarization position angle scales, in my opinion).

(e) I agree with Rick that the line emission asymmetries are a bit more subtle than the text implies (this is why I was keen to show the line pictures in the paper and not leave them languishing in McCarthy's and Ilias' theses! -- do you think the line guys sometimes go a little overboard in making their correlations fit, like modern Gregor Mendels?). 3C265 in particular needs some rewording. I'll try to come up with a suggestion!

(f) I agree with Rick that the comparison of the DP asymmetries between the RGs and the QSRs is worth including given the fuss we make about it in the intro. Would you consider using my DP versus redshift plot for RGs and QSRs as a further Figure, and thus making the point that -- at the same redshift range -- there is no evidence yet for any difference between them?

I'll send you both the detailed comments tomorrow.

Cheers, A.

From root Tue Sep 1 18:46:39 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
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Message-Id: <9209012246.AA03934@NMSU.Edu>
Received: by charon (4.1/NMSU)
      id AA17391; Tue, 1 Sep 92 16:46:13 MDT
From: jburns@NMSU.Edu
To: abridle@aoc.nrao.edu
Subject: Comments
Date: Tue, 1 Sep 92 16:46:13 MDT

Alan:
      Thanks for your initial comments. I would appreciate your
help in re-writing sections of the paper that still suffer from
some of the older problems. I was fairly careful in using the
term hot spot only when it met our criteria; however, there remained
a problem with nomenclature for the other "warmspots" -- I guess we
just call them "features". Anyone, I'll look forward for your
remaining comments & inputs.
      I'll also be trying to take a crack at rewriting some of
the text for the QSO paper as per your suggestions.
      Cheers,
      Jack

From abridle Wed Sep 2 14:32:28 1992
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Message-Id: <9209021831.AA20395@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: jburns@nmsu.edu, rperley
Subject: Attempt at redrafting Intro
Date: Wed, 2 Sep 92 14:31:57 -0400

This paper is the first of a series that reports on a search for jets and counterjets in powerful extended radio galaxies (FR class II sources --- Fanaroff and Riley 1974). This search was motivated by schemes that have been proposed to unify radio-loud FRII quasars and FRII radio galaxies as members of the same parent AGN population observed in systematically different orientations to the line of sight ({\it e.g.,} Bridle and Perley 1984; Barthel 1989). In particular, Barthel suggested that all extended radio sources with powers $P_{\rm 178} \geq 10^{27}$ W Hz^{-1} contain similar jets with bulk relativistic velocities ($\gamma > 2$) but that the optical appearance of their parent objects depends on their orientation relative to the observer. He proposed that a bright optical continuum and a broad-line region are common to all of the parent objects, but are hidden by an obscuring dust torus if the radio jets are oriented near the plane of the sky. AGNs in this orientation would therefore be classified as narrow-line radio galaxies. At the other extreme, if the axis of the radio jets is near the line of sight, the strong continuum and broad lines would not be obscured, and the same source would be classified as a radio-loud quasar. (Intermediate cases might be described either as quasars or as broad-line radio galaxies.) In Barthel's model, the parent population of intrinsically similar AGNs is randomly oriented, and the transition from radio-galaxy to quasar properties should occur around 44° to the line of sight.

The apparent flux densities of relativistic jets also depend strongly on their orientation relative to the observer because of beaming effects ({\it e.g.,} Blandford and K\"onigl 1n79). The extended lobe emission should not be beamed signyficantly, however, as most models of the lobes imply that bulk motions within them will be sub-relativistic and that the pitch angles of the relativistic electron motions will be randomized relative to the magnetic fields. The {\it prominence} of the jets relative to the lobes (measured by the ratio of their integrated flux densities) may therefore be an indicator of the importance of beaming in any sample of FRII sources.

Unified models of FRII sources, such as Barthel's, predict systematic differences between the prominence, relative to the lobes, of the jets and counterjets in quasars and radio galaxies. In the quasars, the emission from the (approaching) jet would be beamed towards the observer and that from the (receding) counterjet would be beamed away. In FRII radio galaxies, whose jets should be systematically nearer to the plane of the sky, the emission of neither jet should be strongly beamed towards the observer. FRII quasars should therefore tend to have jets that are more prominent relative to their lobes than those in the radio galaxies. The counterjets should however be easier to detect in the radio galaxies, and the jet/counterjet ratios should be

systematically higher in quasars than in radio galaxies. The {\it relative prominence} (integrated flux density ratios) of jets, counterjets and lobes in extended radio galaxies and quasars can therefore provide several good tests for unified schemes such as Barthel's if relativistic beaming effects are dominant.

A second type of test for such unified schemes may be provided by the systematically asymmetric depolarization of the lobes of FRII sources that was discovered by Laing (1988) and by Garrington {\it et al.} (1988, 1991). These authors found, in samples dominated by quasars, that the lobe on the side of the brighter jet systematically depolarizes at a longer wavelength than the other lobe. They suggested that the depolarization asymmetry could depend on orientation, if it arises from unresolved structure in a Faraday-thick magnetoionic medium that surrounds the typical FRII source. According to the unified schemes, the lobe that is fed by the brighter jet would also be closer to the observer. This lobe would be viewed along a shorter path through the magnetoionic medium, and would therefore depolarize at a longer wavelength than the other lobe. If the jets in FRII quasars are indeed oriented nearer to the lines of sight than those in FRII radio galaxies, and all of the AGNs are surrounded by similar media, we should expect to find greater depolarization asymmetries in the quasars than in the radio galaxies.

This series of papers seeks to test the unified schemes using data on jet and counterjet prominence and on depolarization asymmetries from sensitive, high-resolution VLA imaging and polarimetry of samples of FRII radio galaxies and quasars. The importance of high-quality imaging for such work was demonstrated by preliminary results (reported in Bridle 1990) of a study of a sample of twelve extended 3CR quasars (Bridle {\it et al.} 1992). This study showed that fully-sampled VLA syntheses detected the brighter jets in 100\% of the 3CR quasar sample, and found faint counterjet candidates in about half of them. The status of these quasar counterjet candidates is ambiguous, however. Most are discontinuous, and none occurs opposite an uninterrupted straight segment of the main jet. These properties suggest that interactions and perturbations of the quasar jets play an important role in determining their visibility. The quasar study also emphasized the difficulty of distinguishing faint jets and counterjets from filaments in the lobes of FRII sources. High-quality images are clearly crucial
to any attempt to
test unified schemes using jet and counterjet prominence statistics. We have therefore sought to obtain images that will let us exclude ``twisted or broken" regions of jets that may have interacted strongly with their environments, and that may distinguish jets and counterjets from other curvilinear fine structure in the lobes.

This paper defines a sample of 13 FRII 3CR radio galaxies whose properties we wish to compare Rith those of the sample of 13 FRII 3CR quasars obtained by combining the Bridle {\it et al.} (1992) quasar sample with the study of 3C\,47 by Fernini {\it et al.} (1991). It presents results on the first 5 of these 13 radio galaxies to be observed in an ongoing program of sensitive, high-resolution VLA imaging at 1.4, 5 and 8.4 GHz.

\end
#

From abridle Wed Sep 2 18:04:01 1992
From: abridle (Alan Bridle)
To: jburns@nmsu.edu, rperley
Subject: Details re RG paper
Date: Wed, 2 Sep 92 18:03:41 –0400

```
Title page:  AHB address -- 520 Edgemont Road      (we now need street #)
                            22903-2475             (we seem to need 9-digit)

Abstract:
  line 8     "asymmetries between 6cm and 20cm"

Introduction:
      suggested rewrite to cover AHB and RAP suggestions sent separately

Section 2.1:

  First line: "Our sample of 3CR radio galaxies was originally ...."
  Third line: "Our objective was to have two similar samples ..."
  p.6, item(2): "To match that of the quasar sample, with the exception
                 of 3C9." ??
                (I agree with Rick's comment that the  lobe power distributions
                 are also interesting here -- how similar were they for the
                 quasars and the RGs?)

Section 2.2:

  First line: "This paper presents the results of the first of two rounds
               of VLA observations allocated to this project, in which we
               observed the five radio galaxies shown in bold type in Table
               1."

Section 3:

  Item(iii):  "used the bandwidth listed in Table 2.  These bandwidths
               were chosen to maximize sensitivity while limiting the
               distortions produced by chromatic aberration (\it e.g.,}
               Cotton (1989)) at the outer edges of the lobes to $<5\%$
               (as measured by the intensity reduction for a point
               source)."

  p.7, last lines:
               "For all the observations, the primary flux density and
                position angle calibrator was 3C\,286, which we assumed
                to have flux densities of ??Jy, 7.4 Jy, amd ??Jy at
                1.4, 5 and 8.4 GHz, and a polarization position angle of
                66$^{circ}$ at all frequencies.  The resulting flux density
                scale is that of Baars {\it et al.} (1977)."

Section 4.1:

  p.9, line 2:  "For consistency, we use the definitions proposed by
                 Bridle {\it et al.} (1992), which we summarize as follows:"
       line 8:  "(c) aligned with the nucleus of the parent object where
                 it is closest to it."
  (4) Hot Spot: "If no jet is detected, a feature that (a) is the
                 brightest feature in the lobe, (b) has a surface
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second para: replace "our" by "the" -- they are public domain!
first line

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From root Wed Sep 2 18:33:08 1992
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
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"jburns@NMSU.Edu" "<9209022233.AA25185@NMSU.Edu>" "11" "Re: Details re RG paper"
"^From:" nil nil "9"])
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          id AA23425; Wed, 2 Sep 92 18:33:07 -0400
Received: from charon (charon.NMSU.Edu) by NMSU.Edu (4.1/NMSU-1.18)
      id AA25185; Wed, 2 Sep 92 16:33:06 MDT
Message-Id: <9209022233.AA25185@NMSU.Edu>
Received: by charon (4.1/NMSU)
      id AA27870; Wed, 2 Sep 92 16:33:06 MDT
From: jburns@NMSU.Edu
To: abridle@polaris.cv.nrao.edu
Cc: rperley@aoc.nrao.edu
Subject: Re: Details re RG paper
Date: Wed, 2 Sep 92 16:33:06 MDT

Alan:`
      Got your comments, thanks. I'll be working on incorporating
these into the text & checking again on the hot spots over the next
few weeks. I'm not sure about my timescale since I'm preparing to
go to an Observational Cosmology conference in Milan in two weeks.
If you have a priority, would you let me know if you'd like me to
work on the QSO or the RGs paper?
      Also, I'll E-mail TEX files of the revised version to you
& Rick after all changes are made.
      Cheers,
      Jack

From abridle Wed Sep 2 18:04:01 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
["14395" "Wed" "2" "September" "92" "18:03:41" "-0400" "Alan Bridle" "abridle
" nil "305" "Details re RG paper" "^From:" nil nil "9"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA18253; Wed, 2 Sep 92 18:03:41 -0400
Message-Id: <9209022203.AA18253@polaris.cv.nrao.edu>
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Date: Wed, 2 Sep 92 18:03:41 -0400

Title page: AHB address -- 520 Edgemont Road (we now need street #)
22903-2475 (we seem to need 9-digit)

Abstract:
line 8 "asymmetries between 6cm and 20cm"

Introduction:
suggested rewrite to cover AHB and RAP suggestions sent separately

Section 2.1:

First line: "Our sample of 3CR radio galaxies was originally ...."
Third line: "Our objective was to have two similar samples ..."
p.6, item(2): "To match that of the quasar sample, with the exception
of 3C9." ??
(I agree with Rick's comment that the lobe power distributions
are also interesting here -- how similar were they for the
quasars and the RGs?)

Section 2.2:

First line: "This paper presents the results of the first of two rounds
of VLA observations allocated to this project, in which we
observed the five radio galaxies shown in bold type in Table
1."

Section 3:

Item(iii): "used the bandwidth listed in Table 2. These bandwidths
were chosen to maximize sensitivity while limiting the
distortions produced by chromatic aberration (\it e.g.,}
Cotton (1989)) at the outer edges of the lobes to $<5\%$
(as measured by the intensity reduction for a point
source)."

p.7, last lines:
"For all the observations, the primary flux density and
position angle calibrator was 3C\,286, which we assumed
to have flux densities of ??Jy, 7.4 Jy, amd ??Jy at
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p.9, line 2: "For consistency, we use the definitions proposed by

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From root Tue Sep 8 10:58:27 1992
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
["1026" "Tue" "8" "September" "92" "08:58:17" "MDT" "Rick Perley" "rperley@aoc.nrao.edu" "<9209081458.AA24662@sechelt.aoc.nrao.edu>" "18" "Hot Spot Definitions..." "^From:" nil nil "9"])
Received: from sechelt.aoc.nrao.edu by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA25600; Tue, 8 Sep 92 10:58:26 -0400
Received: by sechelt.aoc.nrao.edu (4.1/1.3pmg)
id AA24662; Tue, 8 Sep 92 08:58:17 MDT
Message-Id: <9209081458.AA24662@sechelt.aoc.nrao.edu>
From: Rick Perley <rperley@aoc.nrao.edu>
To: abridle, jburns@nmsu.edu
Subject: Hot Spot Definitions...
Date: Tue, 8 Sep 92 08:58:17 MDT

I just reviewed Alan's changes, and am happy with them all, with one possible exception. That being the question of definition of hotspots. I'm unhappy with the limitation imposed by condition (a), to wit: 'is the brightest feature in the lobe'. This forces us to recognize only one (1) hotspot per lobe. I think this is unrealistic, as a number of sources show what is plausibly two termination points of a jet. The best example is Cygnus A, where the Western lobe shows two well defined hotspots. By Alan's definition, hotspot C is the winner, as it is slightly brighter than hotspot A. But by all other criteria, both hotspots pass the test. In my view, what is happening is that hotspot A is , or recently has been, terminated of its life support (so to speak), while hotspot C is just getting revved up. The jet is presumably changing its course, reflecting from the lobe wall, or some such thing. In any event, it seems unnecessarily constricting to force only one spot to the The Hotspot.

Rick

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Message-Id: <9209081603.AA29125@NMSU.Edu>
Received: by charon (4.1/NMSU)
      id AA14793; Tue, 8 Sep 92 10:03:55 MDT
From: jburns@NMSU.Edu
To: rperley@aoc.brao.edu
Cc: abridle@NRAO.EDU
Subject: Re: Hot Spot Definitions...
Date: Tue, 8 Sep 92 10:03:56 MDT

Rick:
      I've had a similar discussion with Alan about the hot spot definition -- there are multiple compact features in most lobes that have previously (& loosely) been called hot spots. The question is should there only be one hot spot per lobe? What impact does this have on the physics & interpretation as you pointed out? However, for practical book-keeping purposes, the definition of a hot spot as defined in the QSO paper & now used in our RG paper is a reasonable one. It does only allow one hot spot (& sometimes not even one) per lobe but that's OK for the purposes of this paper. I vote to keep & use this definition of a hot spot in this paper to stay consistent with the QSO paper.
      Cheers,
      Jack

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" nil "27" "Re: Hot Spot Definitions..." "^From:" nil nil "9"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA28918; Tue, 8 Sep 92 11:13:41 -0400
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From: abridle (Alan Bridle)
To: Rick Perley <rperley@aoc.nrao.edu>
Subject: Re: Hot Spot Definitions...
Date: Tue, 8 Sep 92 11:13:41 -0400

This is an attempt to find the hot spot that is most closely associated
with current, or very recent, jet activity. So it is quite
deliberate to allow only one hot spot per lobe. In these terms,
admittedly different from current practice in the literature (but
that is what the quasar paper is trying to change!), all "older" features are seen
as secondary.

A strong point that has emerged from this definition in the other
paper is that the hot spots so defined are the **only** lobe
inhomogeneities (compact features) that correlate with the presence
of the brighter jet. This result was obtained with two different
measures of lobe inhomogeneities, one derived from use of the
Sobel filter in AIPS, and the other from the use of structure
functions.

I think it's well worth using such a strict definition of hot spots,
as it does seem to be leading in an interesting direction (correlations
with the jets and with jet-counterjet lobe differences). It will
definitely stay in the quasar paper as that gang (Hough, Lonsdale, Burns
and Laing) have all bought into it. It would therefore be a good idea
to keep it in this RG paper also.

Would it help if I sent you the quasar paper draft (incomplete)
to read through?

Cheers, Alan

From abridle Wed Oct 7 08:50:14 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
      ["10343" "Wed" "7" "October" "92" "08:49:58" "-0400" "Alan Bridle" "abridle "
nil "771" "Depolarization asymmetry plot" "^From:" nil nil "10"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA22045; Wed, 7 Oct 92 08:49:58 -0400
Message-Id: <9210071249.AA22045@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: jburns@nmsu.edu, rperley
Subject: Depolarization asymmetry plot
Date: Wed, 7 Oct 92 08:49:58 -0400

Here's a Postscript version of the depolarization-asymmetry plot, as
Jack requested for the RG paper. I now have this data on my SPARC
so it will be very easy to make any changes to the plot using Xvgr.
Just let me know if any editing is needed.

A.

========== cut here ==========

From root Wed Oct 7 20:59:41 1992
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
      ["3007" "Wed" "7" "October" "92" "18:59:38" "MDT" "jburns@NMSU.Edu"
"jburns@NMSU.Edu" "<9210080059.AA28456@NMSU.Edu>" "59" "" "^From:" nil nil "10"])
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA14889; Wed, 7 Oct 92 20:59:41 -0400
Received: from NMSU.Edu (opus.NMSU.Edu) by cv3.cv.nrao.edu (4.1/DDN-DLB/1.13)
      id AA18271; Wed, 7 Oct 92 20:59:42 EDT
Received: from charon (charon.NMSU.Edu) by NMSU.Edu (4.1/NMSU-1.18)
      id AA28456; Wed, 7 Oct 92 18:59:38 MDT
Message-Id: <9210080059.AA28456@NMSU.Edu>
Received: by charon (4.1/NMSU)
      id AA21131; Wed, 7 Oct 92 18:59:37 MDT
From: jburns@NMSU.Edu
To: abridle@NRAO.EDU
Date: Wed, 7 Oct 92 18:59:38 MDT

Alan & Rick:

In the next E-mail, I am sending along the revised version of the Fernini et al. RGs paper. The file is a postscript file & you should be able to just print it out. However, I'm concerned that it might be too long & some of it will drop off the edge of the known Universe. If you have trouble printing it, please let me know & I'll FTP it to you instead.

Now, let me tell you about all the changes. Once again, the paper has evolved significantly since the last iteration thanks to your many useful comments. I have attempted to address each comment in detail in the revision. I appreciate the very specific nature of your comments & the replacement wording which made it easier to make the revisions. Here's some details:

(1) There is a new table (Table 5) which reports core sizes & powers from my IMFITS to the images. This seemed an important missing table in the previous draft.
(2) Table 6 has been revised & expanded.
(3) I spent a good deal of time over the past month looking at the individual images, measuring sizes & fluxes, and trying to reproduce & extend what Ilias had done. This was motivated by your questions about specific sources & our definitions about hot spots & cores. I now feel more confident in the numbers & statements made in the text. In particular,

(i) 3C 55 - F8 meets the criteria for a HS as discussed in detail in the text. I've complied with Alan's request to add some specifics when there is a close call on an HS.

(ii) 3C 265 - Feature C is the HS.

(iii) 3C 324 - A & E just make it as hot spots.

(iv) 3a 356 - D & E remain core candidates. Both are unresolved with limits listed in Table 5. However, E has a steep radio spectrum more typical of a CSS source as discussed in the text. I'm not sure that we can say anything further on this subject.

(4) There is a new Fig. 7 on QSO & RG depolarization ratio vs. z provided by Alan. I believe that Alan sent"a copy to Rick as well as to me. Rick, please look it over & see if you agree to keep it in the paper.
(5) Discussion on [OII] has now been substantially firmed up thanks to comments from you both.
(6) I'm looking again at the grey scales in Fig. 1 as per Alan's suggestions.
(7) Linda XXX now has a last time. I know it removes the intrigue but it had to be done!

Overall, I hope the paper is now about ready to submit. I'd welcome any last comments from you both at your earliest convenience.

The one thing that troubles me is that we have effectively removed much of Ilias' words from this paper. Yes, the paper is now more readable & more correct, but has Ilias learned anything from this? Given the fact that I cannot easily communicate with Ilias, I did not see what else we could do. By the way, I'm sorry to report that Ilias' job in Saudi Arabia has again fallen through due to politics in Saudi. I'm not sure what he is going to do at this stage. It will be very difficult for him to work on the 2nd set of runs on this project.

That's all for now,

Jack

From root Thu Oct 8 13:59:46 1992
X-VM-v5-Data: ([nil nil nil nil nil nil t nil nil]
      ["48866" "Thu" "8" "October" "92" "10:53:49" "PDT" "Anonymous NED user"
"ned@ipac.caltech.edu" nil "1328" "" "^From:" nil nil "10"])
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA22254; Thu, 8 Oct 92 13:59:45 -0400
Received: from ipac.caltech.edu by cv3.cv.nrao.edu (4.1/DDN-DLB/1.13)
      id AA12874; Thu, 8 Oct 92 13:54:17 EDT
Return-Path: <ned@ipac.caltech.edu>
Received: from denver.ipac.caltech.edu
          by castor.ipac.caltech.edu (5.65-ir.030292)
          id AA09277; Thu, 8 Oct 92 10:53:58 -0700
Received: by denver.ipac.caltech.edu (n.030292)
Message-Id: <9210081753.AA06874@denver.ipac.caltech.edu>
From: Anonymous NED user <ned@ipac.caltech.edu>
To: abridle@NRAO.EDU
Date: Thu, 8 Oct 92 10:53:49 PDT

Your search result, Part No. 1 of 1
---
logon time: Oct 8 10:35:01 1992, remote host name: polaris.cv.nrao.

Your E-mail address : abridle@nrao.edu

Performing search for object "3C 055*" ...
1 object(s) found.

#	Object Name	Equatorial (1950.0 Equinox)	Type	Dist. amin	No. Ref	No. Note
1	*4C +28.05	01h54m19.5s , +28d37m04.8s	G	0.0	25	0

All the names and basic data for Object No. 1.

Name	Type
4C +28.05	RadioS
3C 055	RadioS
B2 0154+28	RadioS
NRAO 0085	RadioS
87GB 015419.2+283649	RadioS
87GB[BWE91] 0154+2836	RadioS
[WB92] 0154+2836	RadioS
87GB[BWE91] 0154+2836 ID	G

Coordinates, Equatorial(1950.0) : 01h54m19.5s ,+28d37m04.8s
Positional Uncertainty (arcsec) : 1.00E+01 x 1.00E+01
Source of Position : 1985PASP...97..932S
Galactic Extinction (B mag) : 0.18
Diameters (arcmin) : 1.4 x
Magnitude : 20.8
Morphological Type : Radio galaxy
Helio. Velocity (km/s), or [Redshift] : [0.7348]

NED adopts Hewitt and Burbidge (1991ApJS...75..297H) redshift (vs. z=0.240).

Search for references from year 1900 to 1992 ...

25 reference(s) for ob`ect No. 1.

Reference No. 1 of 25: 1992ApJS...79..331W
Ap. J. Suppl.
1992 vol. 79 p. 331-467
WHITE, R. L., AND BECKER, R. H.
A NEW CATALOG OF 30,239 1.4 GHZ SOURCES

Reference No. 2 of 25: 1991ApJS...75.1011G
Ap. J. Suppl.
1991 vol. 75 p. 1011-1291
GREGORY, P. C., AND CONDON, J. J.
THE
 87GB CATALOG OF RADIO SOURCES COVERING 0^DEG^ < {DELTA} < +75^DEG^ AT
4.85 GHZ

Reference No. 3 of 25: 1991ApJS...75..297H
Ap. J. Suppl.
1991 vol. 75 p. 297-356
HEWITT, A., AND BURBIDGE, G.
AN OPTICAL CATALOG OF EXTRAGALACTIC EMISSION-LINE OBJECTS SIMILAR TO
QUASI-STELLAR OBJECTS

Reference No. 4 of 25: 1991ApJS...75....1B
Ap. J. Suppl.
1991 vol. 75 p. 1-229
BECKER, R. L., WHITE, R. L. AND EDWARDS, A. L.
A NEW CATALOG OF 53,522 4.85 GHZ SOURCES

Reference No. 5 of 25: 1991ApJ...377...36O
Ap. J.
1991 vol. 377 p. 36-38
ONUORA, L. I.
RADIO SOURCE ORIENTATION AND THE ANGULAR DIAMETER-REDSHIFT RELATION

Reference No. 6 of 25: 1991ApJ...371..478M
Ap. J.
1991 vol. 371 p. 478-490
MCCARTHY, P. J., VAN BREUGEL, W., AND KAPAHI, V. K.
CORRELATED RADIO AND OPTICAL ASYMMETRIES IN POWERFUL RADIO SOURCES

Reference No. 7 of 25: 1989MNRAS.240..701R
M. N. R. A. S.
1989 vol. 240 p. 701-722
RAWLINGS, S., SAUNDERS, R., EALES, S. A., AND MACKAY, C. D.
THE RELATIONS BETWEEN RADIO AND [O III]-EMISSION LINE LUMINOSITIES IN FRII
RADIOGALAXIES

Reference No. 8 of 25: 1989MNRAS.239..401L
M. N. R. A. S.
1989 vol. 239 p. 401-440

LEAHY, J. P., MUXLOW, T. W. B., AND STEPHENS, P. W.
151-MHZ AND 1.5-GHZ OBSERVATIONS OF BRIDGES IN POWERFUL EXTRAGALACTIC RADIO SOURCES

Reference No. 9 of 25: 1989ApJ...336..606B
Ap. J.
1989 vol. 336 p. 606-611
BARTHEL, R. D.
IS EVERY QUASAR BEAMED?

Reference No. 10 of 25: 1988MNRAS.233...87S
M. N. R. A. S.
1988 vol. 233 p. 87-113
SINGAL, A. K.
COSMIC EVOLUTION OF THE PHYSICAL SIZES OF EXTRAGALACTIC RADIO SOURCES AND THEIR LUMINOSITY-SIZE CORRELATION

Reference No. 11 of 25: 1988Ap&SS.141..303B
Ap. Space Sci.
1988 vol. 141 p. 303-331
BROTEN N.W., MACLEOD J.M., VALLEE J.P.
CATALOGUE OF UNAMBIGUOUS (FARADAY-THIN, ONE-COMPONENT, SPECTRUM-SELECTED) ROTATION MEASURES FOR GALAXIES AND QUASARS

Reference No. 12 of 25: 1987A&A...178....1W
Astr. Ap.
1987 vol. 178 p. 1-6
WAMPLER E.J.
OBSERVATIONAL STUDY OF HUBBLE DIAGRAM

Reference No. 13 of 25: 1986JRASC..80..180H
J. R. A. S. Canada
1986 vol. 80 p. 180-196
HIGGS L.A., VALLEE J.P.
RADIO OBSERVATIONS OF A NEGLECTED 3C SOURCE : 3C 428

Reference No. 14 of 25: 1986A&AS...65..485R
Astr. Ap. Suppl.
1986 vol. 65 p. 485-496
ROGER R.S., COSTAIN C.H., STEWART D.I.
SPECTRAL FLUX DENSITIES OF RADIO SOURCES AT 22 MHZ

Reference No. 15 of 25: 1985PASP...97..932S
Publ. A. S. P.
1985 vol. 97 p. 932-961
SPINRAD H., DJORGOVSKI S., MARR J., AGUILAR L.
A THIRD UPDATE OF THE STATUS OF THE 3 CR SOURCES : FURTHER NEW REDSHIFTS AND NEW IDENTIFICATIONS OF DISTANT GALAXIES

Reference No. 16 of 25: 1985Afz....23...47A
Astrofizica

1985 vol. 23 p. 47-53
ANDREASSIAN R.R.
ON THE RELATIVE ORIENTATIONS OF MAGNETIC FIELDS AND MAJOR AXES OF RADIOGALAXIES

Reference No.517 of 25: 1985A&AS...61..547S
Astr. Ap. Suppl.
1985 vol. 61 p. 547-571
STROM R.G., CONWAY R.G.
POLARIZATION MAPS AT 49 CM OF 27 3C SOURCES

Reference No. 18 of 25: 1985A&A...146..392C
Astr. Ap.
1985 vol. 146 p. 392-394
CONWAY R.G., STROM R.G.
LINEAR POLARIZATION AT LAMBDA 49 CM OF 27 DOUBLE RADIO SOURCES

Reference No. 19 of 25: 1984MNRAS.211..833L
M. N. R. A. S.
1984 vol. 211 p. 833-855
LILLY S.J., LONGAIR M.S.
STELLAR POPULATIONS IN DISTANT RADIO GALAXIES

Reference No. 20 of 25: 1984MNRAS.210..611A
M. N. R. A. S.
1984 vol. 210 p. 611-631
ALLINGTON-SMITH J.R.
VARIATIONS OF THE LINEAR SIZES OF EXTRAGALACTIC RADIO SOURCES WITH RADIO LUMINOSITY AND REDSHIFT

Reference No. 21 of 25: 1983MNRAS.204..151L
M. N. R. A. S.
1983 vol. 204 p. 151-187
LAING R.A., RILEY J.M., LONGAIR M.S.
BRIGHT RADIO SOURCES AT 178 MHZ : FLUX DENSITIES, OPTICAL IDENTIFICATIONS AND THE COSMOLOGICAL EVOLUTION OF POWERFUL RADIO GALAXIES

Reference No. 22 of 25: 1981ApJS...45...97S
Ap. J. Suppl.
1981 vol. 45 p. 97 -111
SIMARD-NORMANDIN M., KRONBERG P.P., BUTTON S.
THE FARADAY ROTATION MEASURES OF EXTRAGALACTIC RADIO SOURCES

Reference No. 23 of 25: 1980PASP...92..553S
Publ. A. S. P.
1980 vol. 92 p. 553-569
SMITH H.E., SPINRAD H.
AN UPDATE OF THE STATUS OF THE REVISED 3C CATALOG OF RADIO SOURCES; 22 NEW GALAXY REDSHIFTS

Reference No. 24 of 25: 1966ApJ...144..459W
Ap. J.

1966 vol. 144 p. 459-482
WYNDHAM, J. D.
OPTICAL IDENTIFICATION OF RADIO SOURCES IN THE 3C REVISED CATALOGUE

Reference No. 25 of 25: 1965MmRAS..69..183P
Mem. R. A. S.
1965 vol. 69 p. 183-224
PILKINGTON, J. D. H., SCOTT, P. F.
A SURVEY OF RADIO SOURCES BETWEEN DECLINATIONS 20^DEG^ AND 40^DEG^

Performing search for object "3C 022*" ...
1 object(s) found.

#	Object Name	Equatorial (1950.0 Equinox)	Type	Dist. amin	No. Ref	No. Note
1	4C +50.04	00h48m04.7s , +50d55m44.8s	G	0.0	24	0

All the names and basic data for Object No. 1.

Name	Type
4C +50.04	RadioS
3C 022	RadioS
87GB 004804.3+505541	RadioS
87GB[BWE91] 0048+5055	RadioS
[WB92] 0048+5055	RadioS
87GB[BWE91] 0048+5055 ID	G

Coordinates, Equatorial(1950.0)   : 00h48m04.7s   ,+50d55m44.8s
Positional Uncertainty (arcsec)   : 1.00E+01 x 1.00E+01
Source of Position   : 1985PASP...97..932S
Galactic Extinction (B mag)   : 1.09
Diameters (arcmin)   : 1.4 x
Magnitude   : 22.
Morphological Type   : Radio galaxy
Helio. Velocity (km/s), or [Redshift] : [0.937]

Search for references from year 1900 to 1992 ...
24 reference(s) for object No. 1.

Reference No. 1 of 24: 1992ApJS...79..331W
Ap. J. Suppl.
1992 vol. 79 p. 331-467
WHITE, R. L., AND BECKER, R. H.
A NEW CATALOG OF 30,239 1.4 GHZ SOURCES

Reference No. 2 of 24: 1991ApJS...75.1011G
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1991 vol. 75 p. 1011-1291
GREGORY, P. C., AND CONDON, J. J.
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4.85 GHZ

Reference No. 3 of 24: 1991ApJS...75..297H
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QUASI-STELLAR OBJECTS

Reference No. 4 of 24: 1991ApJS...75....1B
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1991 vol. 75 p. 1-229
BECKER, R. L., WHITE, R. L. AND EDWARDS, A. L.
A NEW CATALOG OF 53,522 4.85 GHZ SOURCES

Refer.nce No. 5 of 24: 1991ApJ...377...36O
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1991 vol. 377 p. 36-38
ONUORA, L. I.
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MCCARTHY, P. J., VAN BREUGEL, W., AND KAPAHI, V. K.
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Reference No. 7 of 24: 1989ApJ...336..606B
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1989 vol. 336 p. 606-611
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IS EVERY QUASAR BEAMED?

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1988 vol. 233 p. 87-113
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LUMINOSITY-SIZE CORRELATION

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Ap. Space Sci.
1988 vol. 141 p. 303-331
BROTEN N.W., MACLEOD J.M., VALLEE J.P.
CATALOGUE OF UNAMBIGUOUS (FARADAY-THIN, ONE-COMPONENT, SPECTRUM-SELECTED)
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1987 vol. 178 p. 1-6
WAMPLER E.J.
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Reference No. 11 of 24: 1986ApJ...300..151L
Ap. J.
1986 vol. 300 p. 151-158
LEBOFSKY M.J., EISENHARDT P.R.M.
NEW EVIDENCE FOR GALAXY LUMINOSITY EVOLUTION

Reference No. 12 of 24: 1986A&AS...65..485R
Astr. Ap. Suppl.
1986 vol. 65 p. 485-496
ROGER R.S., COSTAIN C.H., STEWART D.I.
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1985 vol. 97 p. 932-961
SPINRAD H., DJORGOVSKI S., MARR J., AGUILAR L.
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Reference No. 14 of 24: 1984MNRAS.211..833L
M. N. R. A. S.
1984 vol. 211 p. 833-855
LILLY S.J., LONGAIR M.S.
STELLAR POPULATIONS IN DISTANT RADIO GALAXIES

Reference No. 15 of 24: 1984MNRAS.210..611A
M. N. R. A. S.
1984 vol. 210 p. 611-631
ALLINGTON-SMITH J.R.
VARIATIONS OF THE LINEAR SIZES OF EXTRAGALACTIC RADIO SOURCES WITH RADIO LUMINOSITY AND REDSHIFT

Reference No. 16 of 24: 1984MNRAS.209..159P
M. N. R. A. S.
1984 vol. 209 p. 159-167
PERRYMAN M.A.C., LILLY S.J., LONGAIR M.S., DOWNES A.J.B.
REDSHIFTS OF FAINT 3 CR RADIO SOURCES

Reference No. 17 of 24: 1984JApA....5..349L
J. Astr. Ap.
1984 vol. 5 p. 349-368
LONGAIR M.S., LILLY S.J.
IDENTIFICATIONS AND SPECTRA OF EXTRAGALACTIC RADIO SOURCES

Reference No. 18 of 24: 1984AJ.....89.1111H
A. J.
1984 vol. 89 p. 1111-1123
HEESCHEN D.A.
FLICKERING OF EXTRAGALACTIC RADIO SOURCES

Reference No. 19 1f 24: 1983PASP...95..842S
Publ. A. S. P.
1983 vol. 95 p. 842-872
SEIELSTAD G.A., PEARSON T.J., READHEAD A.C.S.
10.8-GHZ FLUX DENSITY VARIATIONS AMONG A COMPLETE SAMPLE OF SOURCES FROM THE NRAO-BONN S4 SURVEY

Reference No. 20 of 24: 1983MNRAS.204..151L
M. N. R. A. S.
1983 vol. 204 p. 151-187
LAING R.A., RILEY J.M., LONGAIR M.S.
BRIGHT RADIO SOURCES AT 178 MHZ : FLUX DENSITIES, OPTICAL IDENTIFICATIONS AND THE COSMOLOGICAL EVOLUTION OF POWERFUL RADIO GALAXIES

Reference No. 21 of 24: 1981ApJS...45...97S
Ap. J. Suppl.
1981 vol. 45 p. 97 -111
SIMARD-NORMANDIN M., KRONBERG P.P., BUTTON S.
THE FARADAY ROTATION MEASURES OF EXTRAGALACTIC RADIO SOURCES

Reference No. 22 of 24: 1968MNRAS.138...51B
M. N. R. A. S.
1968 vol. 138 p. 51-66
BAILEY J.A., POOLEY G.G.
FAN-BEAM OBSERVATIONS OF RADIO SOURCES AT 408 AND 1407 MHZ

Reference No. 23 of 24: 1967MmRAS..71...49G
Mem. R. A. S.
1967 vol. 71 p. 49-144
GOWER, J. F. R., SCOTT, P. F., WILLS, D.
A SURVEY OF RADIO SOURCES IN THE DECLINATION RANGES -07^DEG^ TO 20^DEG^ AND 40^DEG^TO 80^DEG^

Reference No. 24 of 24: 1966ApJ...144..459W
Ap. J.
1966 vol. 144 p. 459-482
WYNDHAM, J. D.
OPTICAL IDENTIFICATION OF RADIO SOURCES IN THE 3C REVISED CATALOGUE

Performing search for object "3C 265*" ...
1 object(s) found.

#	Object Name	Equatorial (1950.0 Equinox)	Type	Dist. amin	No. Ref	No. Note
1	4C +31.37	11h42m52.0s , +31d50m29.1s	G	0.0	18	1

All the names and basic data for Object No. 1.

Name	Type
4C +31.37	RadioS
3C 265	RadioS
B2 1142+31	RadioS
NRAO 0385	RadioS

87GB 114253.1+315017 RadioS
87GB[BWE91] 1142+3150 RadioS
[WB92] 1142+3150 RadioS
87GB[BWE91] 1142+3150 ID G

Coordinates, Equatorial(1950.0) : 11h42m52.0s ,+31d50m29.1s
Positional Uncertainty (arcsec) : 1.00E+01 x 1.00E+01
Source of Position : 1985PASP...97..932S
Galactic Extinction (B mag) : 0.03
Diameters (arcmin) : 1.4 x
Magnitude : 20.9
Morphological Type : Radio galaxy
Helio. Velocity (km/s), or [Redshift] : [0.811]

Search for references from year 1900 to 1992 ...
18 reference(s) for object No. 1.

Reference No. 1 of 18: 1992MNRAS.256p..53T
M. N. R. A. S.
1992 vol. 256 p. 53p-58p
TADHUNTER, C. N., SCARROTT, S. M., DRAPER, P., AND ROLPH, C.
THE OPTICAL POLARIZATIONS OF HIGH- AND INTERMEDIATE-REDSHIFT RADIO GALAXIES

Reference No. 2 of 18: 1992ApJS...79..331W
Ap. J. Suppl.
1992 vol. 79 p. 331-467
WHITE, R. L., AND BECKER, R. H.
A NEW CATALOG OF 30,239 1.4 GHZ SOURCES

Reference No. 3 of 18: 1992ApJ...385...61R
Ap. J.
1992 vol. 385 p. 61-82
RIGLER, M. A., LILLY, S. J., STOCKTON, A., HAMMER, F., AND LE FEVRE, O.
INFRARED AND OPTICAL MORPHOLOGIES OF DISTANT RADIO GALAXIES

Reference No. 4 of 18: 1991MNRAS.251p..46T
M. N. R. A. S.
1991 vol. 251 p. 46p-50p
TADHUNTER, C. N.
HIGH-VELOCITY GAS IN POWERFUL RADIO GALAXIES

Reference No. 5 of 18: 1991MNRAS.250..198G
M. N. R. A. S.
1991 vol. 250 p. 198-208
GARRINGTON, S. T., AND CONWAY, R. G.
THE INTERPRETATION OF ASYMMETRIC DEPOLARIZATION IN EXTRAGALACTIC RADIO SOURCES

Reference No. 6 of 18: 1991ApJS...75.1011G
Ap. J. Suppl.

1991 vol. 75 p. 1011-1291
GREGORY, P. C., AND CONDON, J. J.
THE 87GB CATALOG OF RADIO SOURCES COVERING 0^DEG^ < {DELTA} < +75^DEG^ AT 4.85 GHZ

Reference No. 7 of 18: 1991ApJS...75..297H
Ap. J. Suppl.
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PILKINGTON, J. D. H., SCOTT, P. F.
A SURVEY OF RADIO SOURCES BETWEEN DECLINATIONS 20^DEG^ AND 40^DEG^

Performing
search for object "3C 324*" ...
3 object(s) found.

#	Object Name	Equatorial (1950.0 Equinox)	Type	Dist. amin	No. Ref	No. Note
1	*4C +21.46	15h47m37.3s , +21d34m42.0s	G	0.0	50	1
2	*3C 324A	15h47m37.3s , +21d34m42.0s	G_Lens	0.0	2	0
3	*3C 324B	15h47m37.3s , +21d34m42.0s	G_Lens	0.0	2	0

All the names and basic data for Object No. 1.

Name	Type
4C +21.46	RadioS
3C 324	RadioS
PKSB 1547+215	RadioS
PKSJ 1549+2125	RadioS
PKS 1547+21	RadioS
87GB 154737.2+213455	RadioS
87GB[BWE91] 1547+2134	RadioS
[WB92] 1547+2134	RadioS
PKSB 1547+215 ID	G

Coordinates, Equatorial(1950.0) : 15h47m37.3s ,+21d34m42.0s

Positional Uncertainty (arcsec) : 3.00E+01 x 3.00E+01
Source of Position : 1985PASP...97..932S
Galactic Extinction (B mag) : 0.13
Diameters (arcmin) : 1.4 x
Magnitude : 21.5
Morphological Type : Radio galaxy
Helio. Velocity (km/s), or [Redshift] : [1.2063]

This galaxy is lensed into two images.

All the names and basic data for Object No. 2.

Name	Type
3C 324A	G_Lens

Coordinates, Equatorial(1950.0) : 15h47m37.3s ,+21d34m42.0s
Positional Uncertainty (arcsec) : 3.00E+01 x 3.00E+01
Source of Position : 1985PASP...97..932S
Galactic Extinction (B mag) : 0.13
Diameters (arcmin) : x
Magnitude : 22.7
Morphological Type :
Helio. Velocity (km/s), or [Redshift] :

One of two images of a gravitationally lensed galaxy.

All the names and basic data for Object No. 3.

Name	Type
3C 324B	G_Lens

Coordinates, Equatorial(1950.0) : 15h47m37.3s ,+21d34m42.0s
Positional Uncertainty (arcsec) : 3.00E+01 x 3.00E+01
Source of Position : 1985PASP...97..932S
Galactic Extinction (B mag) : 0.13
Diameters (arcmin) : x
Magnitude : 23.3
Morphological Type :
Helio. Velocity (km/s), or [Redshift] :

One of two images of a gravitationally lensed galaxy.

Search for references from year 1900 to 1992 ...
50 reference(s) for object No. 1.

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A SURVEY OF RADIO SOURCES BETWEEN DECLINATIONS 20^DEG^ AND 40^DEG^

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WYNDHAM, J. D.
A SEARCH FOR OPTICAL OBJECTS ASSOCIATED WITH 50 RADIO SOURCES

Performing search for object "3C 356*" ..a
1 object(s) found.

#	Object Name	Equatorial (1950.0 Equinox)	Type	Dist. amin	No. Ref	No. Note
1	4C +51.36	17h23m06.9s , +51d00m14.1s	G	0.0	27	1

All the names and basic data for Object No. 1.

Name	Type
4C +51.36	RadioS
3C 356	RadioS
87GB 172308.2+510020	RadioS
87GB[BWE91] 1723+5100	RadioS
[WB92] 1723+5100	RadioS
87GB[BWE91] 1723+5100 ID	G

Coordinates, Equatorial(1950.0) : 17h23m06.9s ,+51d00m14.1s
Positional Uncertainty (arcsec) : 1.00E+01 x 1.00E+01
Source of Position : 1985PASP...97..932S
Galactic Extinction (B mag) : 0.10
Diameters (arcmin) : 1.4 x
Magnitude : 21.5
Morphological Type : Radio galaxy
Helio. Velocity (km/s), or [Redshift] : [1.079]

Search for references from year 1900 to 1992 ...
27 reference(s) for object No. 1.

Reference No. 1 of 27: 1992ApJS...79..331W
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1992 vol. 79 p. 331-467
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1988 vol. 331 p. L73-L76
LE FEVRE, O., HAMMER, F., AND JONES, J.
HIGH SPATIAL RESOLUTION IMAGING OF SOME OF THE MOST DISTANT 3CR GALAXIES

Reference No. 22 of 27: 1988Ap&SS.141..303B
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BROTEN N.W., MACLEOD J.M., VALLEE J.P.
CATALOGUE OF UNAMBIGUOUS (FARADAY-THIN, ONE-COMPONENT, SPECTRUM-SELECTED)
ROTATION MEASURES FOR GALAXIES AND QUASARS

Reference No. 23 of 27: 1988A&A...199...73G
Astr. Ap.
1988 vol. 199 p. 73-84
GIOVANNINI, G., FERRETTI, L., GREGORINI, L., AND PARMA, P.
RADIO NUCLEI IN ELLIPTICAL GALAXIES

Reference No. 24 of 27: 1985PASP...97..932S
Publ. A. S. P.
1985 vol. 97 p. 932-961
SPINRAD H., DJORGOVSKI S., MARR J., AGUILAR L.
A THIRD UPDATE OF THE STATUS OF THE 3 CR SOURCES : FURTHER NEW REDSHIFTS AND
NEW IDENTIFICATIONS OF DISTANT GALAXIES

Reference No. 25 of 27: 1974ApJ...191...43K
Ap. J.
1974 vol. 191 p. 43-50
KRISTIAN, J., SANDAGE, A., KATEM, B.
ON THE SYSTEMATIC OPTICAL IDENTIFICATION OF THE REMAINING 3C RADIO SOURCES.
I. A SEARCH IN 47 FIELDS

Reference No. 26 of 27: 1967MmRAS..71...49G
Mem. R. A. S.
1967 vol. 71 p. 49-144
GOWER, J. F. R., SCOTT, P. F., WILLS, D.
A SURVEY OF RADIO SOURCES IN THE DECLINATION RANGES -07^DEG^ TO 20^DEG^ AND
40^DEG^TO 80^DEG^

JReference No. 27 of 27: 1966ApJ...144..459W
Ap. J.
1966 vol. 144 p. 459-482
WYNDHAM, J. D.
OPTICAL IDENTIFICATION OF RADIO SOURCES IN THE 3C REVISED CATALOGUE

ABOUT THE DATA 2OCT92

Much care has gone into the collection of POSITIONS into NED, and they are carried along with uncertainties and references to their origin. These positions are continually over-written by more accurate values as such become available.

The "basic data" however are indicative values only, in the sense that they originate in many different sources, and have not been placed on a uniform scale. The main sources are catalogs and compilations, with the more accurate data sets favored, and the larger ones favored at comparable accuracy. No information is kept about the origin of "basic data".

More controlled and rigorous data collection is applied to PHOTOMETRIC DATA, a NED function introduced in July of 1992. These measurements are carried along with their uncertainties, references to their origin, and some information about the data collection and processing behind them. Unlike positions or basic data, PHOTOMETRIC DATA are never erased or updated, but should serve as a cumulative record of the measurements on each object. As a future enhancement to NED, additional data frames along the same lines will be introduced for positions, kinematics, classifications and other parameters.

ACKNOWLEDGING NED 15AUG90

(1) If one of your publications benefits from using NED, please include in it the following acknowledgement:

``This research has made use of the NASA/IPAC Extragalactic Database (NED) which is operated by the Jet Propulsion Laboratory, California Institute of Technology, under contract with the National Aeronautics and Space Administration''

(2) When citing NED within a paper, the following statement may be inserted as a footnote:

``The NASA/IPAC Extragalactic Database (NED) is operated by the Jet Propulsion Laboratory, California Institute of Technology, under contract with the National Aeronautics and Space Administration.''

(3) We would also appreciate receiving a preprint or reprint of any publication acknowledging NED at the following address:

N.E.D.
IPAC 100-22
Caltech
PASADENA, CA 91125

From root Wed Oct 7 20:59:41 1992
From: jburns@NMSU.Edu
To: abridle@NRAO.EDU
Date: Wed, 7 Oct 92 18:59:38 MDT

Alan & Rick:

In the next E-mail, I am sending along the revised version of the Fernini et al. RGs paper. The file is a postscript file & you should be able to just print it out. However, I'm concerned that it might be too long & some of it will drop off the edge of the known Universe. If you have trouble printing it, please let me know & I'll FTP it to you instead.

Now, let me tell you about all the changes. Once again, the paper has evolved significantly since the last iteration thanks to your many useful comments. I have attempted to address each comment in detail in the revision. I appreciate the very specific nature of your comments & the replacement wording which made it easier to make the revisions. Here's some details:

(1) There is a new table (Table 5) which reports core sizes & powers from my IMFITS to the images. This seemed an important missing table in the previous draft.
(2) Table 6 has been revised & expanded.
(3) I spent a good deal of time over the past month looking at the individual images, measuring sizes & fluxes, and trying to reproduce & extend what Ilias had done. This was motivated by your questions about specific sources & our definitions about hot spots & cores. I now feel more confident in the numbers & statements made in the text. In particular,

(i) 3C 55 - F8 meets the criteria for a HS as discussed in detail in the text. I've complied with Alan's request to add some specifics when there is a close call on an HS.
(ii) 3C 265 - Feature C is the HS.
(iii) 3C 324 - A & E just make it as hot spots.
(iv) 3C 356 - D & E remain core candidates. Both are unresolved with limits listed in Table 5. However, E has a steep radio spectrum more typical of a CSS source as discussed in the text. I'm not sure that we can say anything further on this subject.

(4) There is a new Fig. 7 on QSO & RG depolarization ratio vs. z provided by Alan. I believe that Alan sent a copy to Rick as well as to me. Rick, please look it over & see if you agree to keep it in the paper.
(5) Discussion on [OII] has now been substantially firmed up thanks to comments from you both.
(6) I'm looking again at the grey scales in Fig. 1 as per Alan's suggestions.
(7) Linda XXX now has a last time. I know it removes the intrigue but it had to be done!

Overall, I hope the paper is now about ready to submit. I'd welcome any last comments from you both at your earliest convenience.

The one thing that troubles me is that we have effectively removed much of Ilias' words from this paper. Yes, the paper is now more readable & more correct, but has Ilias learned anything from this? Given the fact that I cannot easily communicate with Ilias, I did not see what else we could do. By the way, I'm sorry to report that Ilias' job in Saudi Arabia has again fallen through due to politics in Saudi. I'm not sure what he is going to do at this stage. It will be very difficult for him to work on the 2nd set of runs on this project.

That's all for now,
Jack

From abridle Thu Oct 8 20:30:49 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
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Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA22206; Thu, 8 Oct 92 20:29:28 -0400
Message-Id: <9210090029.AA22206@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: jburns@nmsu.edu, rperley
Subject: Lit search for RG paper, comments
Date: Thu, 8 Oct 92 20:29:28 -0400

As it happens, I have just been working with Paddy Leahy on some problems to do with membership in the "nearby" 3CR sample for which we are collecting the 'digital Atlas", and I mentioned our "problem" with the identification of 3C55 based on the "new" core. He said "but I've already published that ...". Mild surprise on my part, but on reading Leahy, Muxlow & Stephens MNRAS 239, 401 (1989), note on p.432, I see that the cat is out of the bag already. There was also a private communication of an (apparently different) redshift from Spinrad to Rawlings et al. MNRAS 240, 701 (1989). I'm not sure whether everybody is talking about the same galaxy, but it seems to me that we should be referencing these earlier discussions of the 3C55 identification. Paddy also referred to an earlier paper by Strom et al. containing a detection of the core, but I haven't found this. I'd like to try to get the reference from him.

This minor surprise prompted me to interrogate the NED database for up-to-date info on all of these RGs. I'll forward the output as the next message.

Another surprise!! The NED data showed me that some people are absolutely, positively convinced that 3C324 is a gravitationally-lensed system, most notably of all LeFevre et al., Nature 326, 268, whose entire topic is: "Is 3C324 the first gravitationally lensed giant galaxy?" They definitely answer "yes" on the basis of its optical appearance and multiple redshifts in its spectrum. There have been confirmatory follow-ups (see the NED database to follow). Surely this highly unusual attribute of the ID should be mentioned in our paper?

I'd like to have a chance to check through the other papers in the NED database that we are not referencing, to make sure there are no more such "surprises" before we sign off on the version Jack has just produced. Jack - are you willing to "hold" while I do this? I estimate about 24 hours for a quick search, might save some egg on our face later ....

On the other side of the coin, I believe there are four references in the reference list of this last draft that are not (now) mentioned in the main text:

Fernini, (thesis)
Orr and Browne 1982
Scheuer and Readhead 1979
van
 Breugel and McCarthy 1989

Perhaps Jack could do a search on the .TEX file with a text editor to confirm this. If so, they should be deleted from the reference list.

I have caught the following typos and/or small grammar problems:

p.6, last line of Sec.1, sentence is in form "we use ...", "we assume ..." so shouldn't it end "and we quote sky positions in epoch B1950." ??

p.6, line 2 from end, "statistically"
~

p.7, line 2, "comprises" should be "contains"
line 2 from end, "the" is missing between "observed" and "five"

p.8, line 10 A and B are italicised here but nowhere else

p.17, line 2 "densities" should be "density"

p.19, line 14 (at end) "show" should be "shows"
line 18 "highest" should be "higher" (there are only 2 lobes)

Throughout: "QSO" is used as the abbreviation for "quasar" whereas in fact we are comparing radio-loud quasars with radio galaxies exclusively. Should we therefore replace "QSO" (which may be radio-quiet) everywhere with "QSR" (which must be radio-loud)?

Table 1 Should last column heading be log(L_{5 GHz}), not log(L) ?

Tables 3b,3c Should last column heading be "Flux density"

Table 4 μJy, not μJy and mJy not mJy

I also have a few small points of meaning/science:

p.11, last line says that the jet in 3C22 "fades" into the NW lobe. Is this right? From the contours and the grey scale, this is not obvious, it even looks a little bit the other way around as the contour level is increasing. Do we mean "blends with the emission near the hot spot"? This could be important, as the question of whether most jets *brighten* near hot spots has some physics in it.

p. 12, line 6 from end: we didn't truncate the I maps below a given level of p as this seems to say. I think what this means is: "For the composite I-p-chi displays, we truncated ...."

p.14, line 4: I'm not convinced that this structure is at all unusual among FRII 3CR radio galaxies. Again from browsing in the
r data for the low-z 3CR Atlas (many of these being in Leahy and Perley, Rick!) I can see similar well-collimated behaviour immediately behind the hot spots, then flaring back toward the core, in 3C16, 3C79, 3C132 (both lobes), 3C173.1, 3C184.1 (both lobes), 3C 381 and 3C390.3.

So I suggest we drop the words 'an unusual" and substitute "a striking".

Maybe Jack can mull over whether he really weants to suggest that *all* of the above sources might be examples of a "born-again" jet model? (I love the model, but I'm not sure I would myself seize this particular opportunity to promote it again!)

p.20, para on Figure 7:

I think we should *say* something about the trend that dominates this Figure. How about:

"Figure 7 plots the lobe depolarization asymmetry ratios versus red shifts for the sample of radio galaxies and quasars that results from combining the Garrington {\it el.} (1991) data with our new measurements. The upper envelope of this plot clearly reaches to much higher depolarization ratios for the quasars at the higher red shifts. The origin of this effect is unclear, though it may be related to higher circumgalactic densities and magnetic fields around the objects at higher red shifts. For our present purpose, however, Figure 7 emphasizes that we must compare the depolarization asymmetries of radio galaxies and quasars at similar redshifts, to avoid confusion with the apparent redshift-dependence. If we consider only the data for $z<1.2$, there is no evidence for any difference in the depolarization ratios between the radio galaxies and the quasars, but the numbers of objects in both samples are small."

Note that in Figure 7 as plotted there is a small asymmetry beteen the treatment of the quasars and the radio galaxies. For the Garrington et al. sample, the ratio plotted is DP(counterjetted)/DP(jetted) because the jet sidedness was known for every source. For our objects, the ratio plotted is DP(larger DP)/DP(smaller DP) because we do not generally know which side is jetted. This is a small difference, because of the strong correlation between DP(larger) and the counterjet side, but it does explain why a few of the ratios are <1 from the Garrington et al. sample. If you like, I can replot this so they are all DP(larger)/ DP(smaller) for complete consistency. The overall look of the diagram will not change, not will our conclusions, but a few details near unit ratio will change.

p.22, "Second ..." paragraph.
I'd like to emphasize the nature of the result here by saying

"None of these putative jets meets our quantitative criteria for a jet." (line 4)

and

".. in which 13 of 13 objects have unambiguous jets according to the same quantitative criteria."

From root Fri Oct 9 09:21:23 1992
From: "JBVAD::JPL"@UVAX1.AOC.NRAO.EDU
To: ABRIDLE@polaris.cv.nrao.edu
Subject: 3C55
Date: Fri, 9 Oct 1992 7:21:27 MDT

Alan,
No, I havn't published the core position: I'm STILL working on that project. The Strom et al was a red herring, sorry. I was thinking of Strom et al (1990) A&A, 227, 19; but in fact 3C55 is not in there!
Act
OOps
Actually where I saw it was a draft ms of an update of LRL by Laing & Riley in preparation, which cites Laing & Owen ("1990" but also still in preparation [of course]) giving the core at
01 54 19.06 28 37 02.8
we have detected the core clearly at 5, 8, & 15 GHz and also somewhat confused by the large-scale emission, at 1.4 and 1.6 GHz. All these datasets relied mainly on self cal so we did not use a nearby phase reference and so the positions are not very accurate. However my best guess is
01 54 19.051 +/- 0.009 28 37 02.91 +/- 0.05
(errors from the scatter in individual measurements).

Actually, thinking about this, we had the 15 GHz map in November 1985. I pointed out the discrepancy to Julia Riley, who wrote to Hy Spinrad, who measured the new position and redshift. He sent Julia a preliminary position and redshift in September 1986, giving position:
01 54 19.03 28 37 00.6
and commented "off a bit in declination from the MERLIN" - which he mistakenly thought provided my radio position. Julia and I felt that this offset was more likely to be due to optical measurements, but did not persue the matter.

I really am working on this data: I hope to get a paper submitted early next year. It's very difficult work as the results depend crucially on accurate calibration of the data and so I have had to check and recheck this... with 64 different datasets! But I'm in the home stretch at last.

cheers, Paddy

From abridle Tue Oct 13 11:18:27 1992
From: abridle (Alan Bridle)
To: jburns@NMSU.Edu, rperley
Subject: Re: Lit search for RG paper
Date: Tue, 13 Oct 92 11:17:51 -0400

I'm still working on this, it's turning into a long paper chase ...

I am uncovering the following:

3C55 -- past discussion of ID ambiguity, and published versions of the Spinrad redshift.
-- depolarization asymmetry at longer wavelengths (Strom & Conway 1985)

3C265 -- depolarization asymmetry at longer wavelengths (Strom & Conway)

3C324 -- claimed gravitational lens in optical (many refs, see NED stuff I sent you on Friday)

-- depolarization asymmetry quoted by Strom & Conway

3C356 -- extensive discussions of the two-core two-galaxy ambiguity by Rigler et al., Eisenhardt et al., Eales and Rawlings, with detailed IR and [O] imaging. All should be referenced in our paper, though I believe our conclusion (two active nuclei, don't know which is ID), will probably stand. There are several references to private communications about radio cores from Robert Laing, I may roust him for any info he could add to spectra or compactness.

As I'm still turning things up, I will keep going on this as I can make time among other things today, and will send you both some suggested text revisions a.s.a.p.

Some of this stuff is post-thesis, so we can understand Ilias did not turn it up in his drafts. Some, however, is old stuff that seems to have slipped through his net ....

From root Wed Oct 14 11:42:44 1992
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"jburns@NMSU.Edu" "<9210141542.AA04984@NMSU.Edu>" "10" "Re: Lit search for RG
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id AA31168; Wed, 14 Oct 92 11:42:42 -0400
Received: from charon (charon.NMSU.Edu) by NMSU.Edu (4.1/NMSU-1.18)
id AA04984; Wed, 14 Oct 92 09:42:32 MDT
Message-Id: <9210141542.AA04984@NMSU.Edu>
Received: by charon (4.1/NMSU)
id AA02794; Wed, 14 Oct 92 09:42:30 MDT
From: jburns@NMSU.Edu
To: abridle@polaris.cv.nrao.edu
Subject: Re: Lit search for RG paper
Date: Wed, 14 Oct 92 09:42:32 MDT

Alan:

Thanks for continuing to root out these references. This will be quite helpfu.

I put a new version of Fig. 1 in the mail for you today to have a look at. I think it's better than the first version although it is very hard to gauge what structures are best to display with the grey-scale given the limited dynamic range available on such images. I hope this is a good compromise.

Cheers,

Jack

From abridle Fri Oct 16 11:21:46 1992
From: abridle (Alan Bridle)
To: jburns@nmsu.edu, rperley
Subject: Changes to text based on depol literature
Date: Fri, 16 Oct 92 11:20:41 -0400

>From the literature search, I feel that our present text is delinquent in not making comparisons with the previous depolarization estimates that were out there. After going through the references, I feel we should make some changes in Sections 5, 6 and 7 and in the references as follows:

====== start Sec.5 para. 3 replacement =====

The compilation of integrated polarizations by Tabara \& Inoue (1980) estimates half-depolarization wavelengths of 17cm for 3C\,356m 23 cm for 3C\,324, >21 cm for 3C\,22 and 3C\,55, abd >31 cm for 3C\,265. Our depolarization data (Table 7) generally agree with Tabare \& Inoue's results, in that neither 3C\,55 nor 3C\,265 shows significant depolarization between 8.4 GHz and 1.4 GHz, and the other three sources show depolarization only between 4.9 and 1.4 GHz.

Strom and Conway (1985) report asymmetric depolarization in 3C\,55 and 3C\,265 between 1,4 and 0.5 GHz at 20.3 \times$ 20.3 \cosec\delta$ resolution. Their lower-frequency data are the only evidence for depolarization in these sources. For 3C\,324, there is an apparent discrepancy between our results amd the earlier work of Conway {\it et al.} (1983) and of Pedelty {\it et al.} (1989). We find that the north-east lobe is significantly more depolarized at 20 cm, whereas Conway {\it et al.} quote half-depolarization wavelengths of 15cm and 22cm for the south-west and north-east lobes respectively. Pedelty {\it et al.} find the lobes to be equally depolarized on average, with the strongest depolarization being in the trailing portion of the west lobe. We conclude that the depolarization asymmetry of 3C\,324 is poorly established at present.

For 3C\,22, our data provide new evidence for a significant depolarization asymmetry between 6cm and 20cm, the side that depolarizes at the shorter wavelength being that with the fainter, or counter, jet. For 3C\,356, we find significant depolarization in both lobes between 6cm and 20cm, symmetric to within our errors. This result conflicts with that of Pedelty {\it et al.} (1989), who found depolarization only in the south lobe between these wavelengths. We conclude that the depolarization asymmetry of 3C\,356 is also poorly established.

====== end Sec.5 para. 3 replacement ======

(I sent Jack comments on the last para in section 5 in my previous message. I do not think these are altered by the additional changes suggested above. We should, however, modify the discussion of Section 5's results in Sections 6 and 7. Perhaps as follows?)

===== begin Section 6, para 2 partial replacement ======

For 3C\,265, the brighter [OII] emission is on the SE side of the nucleus, but there is evidently also an extended [OII] emission region towards the NW. Thus, the brighter emission line region is on the side of the shorter radio lobe, but it is notable that there is

significant line emission on both sides, no significant depolarization at 20cm on either, and greater depolarization at 49cm on the side of the longer radio lobe. For 3C\,324, the emission line gas is extended along the axis of the radio source, but there is no clear indication either of an [OII] emission asymmetry or of a depolarization asymmetry. The symmetries of the optical data for this source may also be complicated by gravitational lensing (see Section 4.2.4). For 3C\,356, the relation between the [OII] line-emitting gas and the source is complicated by the uncertainty in the optical identification (Section 4.2.5). We note, however, that the south-east lobe must be the closer whether either feature D or feature E marks the parent object of the extended radio structure. Our data show that the south-east (closer) lobe is not strongly depolarized at 20cm, and the north-west (further) lobe is the more strongly depolarized at longer wavelengths (Strom \& Conway 1985).

We conclude that there is no clear correlation between the depolarization asymmetries of these sources and either their emission-line asymmetries or their lobe-length asymmetries.

====== end Sec.6 partial replacement ======

====== start Sec.7 para.4 replacement ======

Section 5 showed that there is little depolarization in these five radio galaxies as the wavelength increases from 3.6 to 6 cm, but three (3C\22, 3C\,324 and 3C\,356) show significant depolarization between 6 and 20cm. 3C\,22, the only source in this group in which we have detected an unambiguous radio jet, has a strong depolarization asymmetry with the jetted lobe being the less depolarized at 20cm. In both 3C\,324 and 3C\,356, the sign of the depolarization asymmetry is unclear, while both 3C\,55 and 3C\,265 exhibit asymmetric depolarization at longer wavelengths. Combining our data with those of Garrington {\it el.} (1991), we found no evidence for differences in the lobe depolarization asymmetry between radio galaxies and quasars {\it at similar redshifts}, but the sample is small.

===== end Sec.7 para.4 replacement ========

===== add to references =====

Conway, R.G., Birch, P., Davis, R.J., Jones, L.R., Kerr, A.J. and Stannard, D. 1983, MNRAS 202, 813.

Strom, R.G. and Conway, R. G. 1985, A. \& A. Suppl. 61, 547.

===== end add to references

Note also that the Pedelty et al. ref is incorrectly given as Ap.J. in present text. Correct journal is A.J.

I would also like to put together some changes to the individual-source sections to deal with the source-identification issues that were raised in the other literature, but will not have time to provide text on this until after the Visualization Workshop -- i.e. until next Wednesday. Is that acceptable to you guys?

From abridle Wed Oct 14 15:13:19 1992
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Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA24608; Wed, 14 Oct 92 15:12:54 -0400
Message-Id: <9210141912.AA24608@polaris.cv.nrao.edu>
References: <9210141542.AA04984@NMSU.Edu>
From: abridle (Alan Bridle)
To: jburns@NMSU.Edu
Subject: Re: Lit search for RG paper
Date: Wed, 14 Oct 92 15:12:54 -0400

I'll keep my eye out for Fig.1 in the mail. Thanks for taking another
crack at that.

I've been distracted onto other things today but have basically finished the
actual searching of the refereneces, need now to put a few words together
about what they are saying re the sources. I've also bugged Robert re
his unpublished data on 3C356 to see if he has any further clues re the
ID problem. The situation in the luterature is really remarkably
confused, as different people seem to have been told that "their" ID
coincides with a different radio "core"!

Note that the Strom et al. polarimetry asserts that the E lobe of 3C55
is more depolarized than the W lobe, and the West lobe of 3C265 more
depolarized
than the E lobe, at 49cm. They might have a better grip
on the asymmetry for these sources than we do, by being further into
the Faraday thick regime. For 3C324, however, I think their data are
in conflict with ours. In any case, I'm pretty convinced that we
should be referring to the Strom et al. work.

Cheers, A.

I would also like to put together some changes to the individual-source sections to deal with the source-identification issues that were raised in the other literature, but will not have time to provide text on this until after the Visualization Workshop -- i.e. until next Wednesday. Is that acceptable to you guys?

From abridle Mon Oct 26 16:39:43 1992
From: abridle (Alan Bridle)
To: jburns@nmsu.edu, rperley
Subject: 3C356 identification section
Date: Mon, 26 Oct 92 16:38:01 -0500

Hello guys, I'm back from a bad bout of flu that hit me last Tuesday evening, and I've just groped my way back out of the accumulated pile of chores into the FRII RGs paperwork. I still have some changes to suggest for the identification sections based on the literature search. Here's the first of these:

For 3C356, I suggest we replace paras 2 and 5 of Section 4.2.5 with the following three paras:

~~~~~~~~~~~~~~~~~~~~~~~~~~

Our observations show two compact radio features, (D) and (E), in the inner part of the source. The peak of the brighter feature, (D), is at $\alpha =$ .... in good agreement with that of the optical identification suggested by Spinrad {\it et al.} (1985), which is at ..... This peak also appears to coincide with the compact peak of the resolved K-band (2.2μ) feature (b) detected by Eales \& Rawlings (1990) and by Eisenhardt \& Choksi (1990). This coincidence does, not, however, uniquely establish the optical identification of the extended radio structure, because there is a similarly good positional agreement between the fainter radio peak (E) at ....., the alternate optical identification previously proposed by Riley {\it et al.} (1980) at ....., and the compact 2.2μ feature (a) of both Eales \& Rawlings (1990) and Eisenhardt \& Choksi (1990). Rigler {\it et al.} (1992) suggest that (a/E) is the parent of the radio structure because this galaxy has a higher ionization spectrum. They also suggest that (b/D), which exhibits an extended optical emission line system, is a companion galaxy that has wandered into the path of an unseen radio jet emanating from (a/E).

Gaussian fits to our 6cm data show that both (D) and (E) are unresolved (Table 5). Our 3.6cm data detect both (D) and (E) at a resolution of 0.84", with peak flux densities of 1.05 and 0.25 mJy respectively. Thus the 6cm to 3.6cm spectral indices (defined by S$_{\nu} \propto \nu^{-\alpha}$) of (D) and (E) are 0.1 and 1.1 respectively. (D) therefore has the more typical spectral index for the compact core of an extended radio galaxy, whereas (E) has a spectral index more typical of a steep-spectrum, compact source.

We conclude that the available data on the two compact radio features near the center of 3C356 do not resolve the identification ambiguity uniquely. Instead, both (a/D) and (b/E) display several characteristics of active galactic nuclei and it cannot yet be determined which is responsible for the large-scale radio structure. This ambiguity may remain until more sensitive radio images detect a large-scale radio jet linking one of these two nuclei to the radio lobes.

~~~~~~

If so, also add to references:

Eales, S.A. and Rawlings,S. (1990), MN {\bf 243}, 1P.

Eisenhardt, P. and Choksi, A. (1990), Ap.J. {\bf 351}, L9.

Rigler, M.A., Lilly, S.J., Stockton, A., Hammer, F. and Le F\'evre, O. (1992), Ap.J. {\bf 385}, 61.

~~~~~~

Others to come asap, Alan
~~~~~~

From root Mon Oct 26 16:59:02 1992
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"jburns@NMSU.Edu" "<9210262158.AA09694@NMSU.Edu>" "15" "Re: 3C356 identification
section" "^From:" nil nil "10"])
Received: from dns1.NMSU.Edu by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA26309; Mon, 26 Oct 92 17:58:59 -0400
Received: from charon (charon.NMSU.Edu) by NMSU.Edu (4.1/NMSU-1.18)
      id AA09694; Mon, 26 Oct 92 14:58:53 MST
Message-Id: <9210262158.AA09694@NMSU.Edu>
Received: by charon (4.1/NMSU)
      id AA05832; Mon, 26 Oct 92 14:58:52 MST
From: jburns@NMSU.Edu
To: abridle@polaris.cv.nrao.edu
Subject: Re: 3C356 identification section
Date: Mon, 26 Oct 92 14:58:53 MST

Alan:
      Changes look great. Please keep them coming as they
seem reasonable. I'm trying to stay up with them as you send
them along. Have you received the new version of Fig. 1 yet?
      I'll be flying to Washington on Tuesday to give colloquiua
at Goddard & NRL on Wednesday & Thursday. I should be back in
the office on Friday. Just thinking out loud -- Craig Sarazin
expressed some interest in my recent work on Abell clusters involving
the Owen et al. VLA survey & ROSAT sky survey plus pointed observations
to investigate the environs of cluster radio galaxies. Maybe, on
one of my trips back east, I should come to C'ville to give a
colloquium at UVa or NRAO. It must be 13+ yrs since I've given
a talk in Charlottesville.
      Cheers,
      Jack

From abridle Mon Oct 26 17:07:02 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
["358" "Mon" "26" "October" "92" "17:06:10" "-0500" "Alan Bridle" "abridle "
nil "8" "Re: 3C356 identification section" "^From:" nil nil "10"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA35070; Mon, 26 Oct 92 17:06:10 -0500
Message-Id: <9210262206.AA35070@polaris.cv.nrao.edu>
References: <9210262158.AA09694@NMSU.Edu>
From: abridle (Alan Bridle)
To: jburns@NMSU.Edu
Subject: Re: 3C356 identification section
Date: Mon, 26 Oct 92 17:06:10 -0500

Would be a pleasure to have you come through here some time --
the NRAO and U.Va. colloquiua are co-ordinated, of course, and
many folks go to both series. Any time you know you'll be
interested in heading East, let me know and I'll arrange a slot
in the series for you. You'd of course be welcome to stay at
our house while visiting C'ville.

Cheers, A.

From abridle Tue Oct 27 11:33:49 1992
From: abridle (Alan Bridle)
To: jburns@nmsu.edu, rperley
Subject: Last changes based on lit review
Date: Tue, 27 Oct 92 11:31:10 -0500

Here's the final instalment of changes that I would like to suggest
to the RG paper based on the literature search:

Delete first sentence of Section 4.2.2 (3C55) and replace by:

This source is a 69" double previously imaged at radio wavelengths by
Jenkins {\it et al.} (1977), Schilizzi {\it et al.} (1982), Strom \&
Conway (1985) and Leahy {\it et al.} (1989). Laing {\it et al.}
(1983) gave an optical identification with a galaxy at $z=0.27$ but
Spinrad (private communication, reported in Hewitt \& Burbidge 1991)
has since reidentified the source with a galaxy at $z=0.7348$.

Add after the present third sentence of Section 4.2.2:

Leahy {\it et al.} also report the detection of this radio core at 5,
8 and 15 GHz, at a preliminary position (Leahy, private communication)
0.004 s earlier than ours in Right Ascension and 0.07" north of ours
in declination. Both of these offsets are well within the errors
of the radio observations. Both radio positions disagree by about
2" in δ with that quoted by Spinrad (private communication)
of ..... for the revised optical identification, which is
marked by a cross in Figure 3. This discrepancy in declination
leaves the new optical identification in some doubt.

(Delete balance of Section 4.2.2, para. 1)

Insert after first sentence of Section 4.2.4 (3C324), para.2:

This object is apparently one of the most luminous known galaxies. It
is now thought (Le F\'evre {\it et al.} 1987; Hammer \& Le F\'evre
1990) to be a gravitational mirage produced by the superposition of a
foreground, possibly spiral, galaxy at $z=0.845$ on a background
narrow-line emitting galaxy at $z=1.206$.

Add to references:

Hammer, F. and Le F\'evre, O. (1990), Ap.J. {\bf 357}, 38.

Hewitt, A. \& Burbidge, G. (1991), Ap.J.Suppl. {\bf 75}, 297.

Le F\'evre, O., Hammer, F., Nottale,L. and Mathez, G. (1987),
Nature {\bf 326}, 268.

Leahy, J.P., Muxlow, T.W.B. and Stephens, P.W. (1989), MNRAS {\bf 239},
401.

==========

Re Figure 1 -- the new version shows more details than the previous one, so is probably an improvement. What I would really like to do is to search on "Figure 1" in the .TEX file to check quickly whether everything we say based on Figure 1 can in fact be discerned on the new version. If Jack could ship me the .TEX file for that purpose, I'll do such a check. (I won't confuse anything by editing in it, Jack!) Just scanning the paper visually I can't find the references to Figure 1 in the text for 3C356 or 3C324 (Secs. 4.2.4 and 4.2.5) so I may be missing things at the moment.

Yes, it's much changed since Ilias' version and I guess if he's out of reach we just have to hope he agrees with what we're doing? I don't relish doing this much modification to an incommunicado "first author" but do we actually have an alternative in this case? Is he completely unreachable at this point, Jack? I guess Jack is weighing the balance between Ilias getting a publication added to his record soon and him not having input on the final version. If it's conceivable that we can get his input in a reasonable time, I would feel much more comfortable. But Jack should decide that issue; if he can live with it, I can.

Cheers, A.

From abridle Mon Nov 2 12:05:01 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
      ["10146" "Mon" "2" "November" "92" "12:04:42" "-0500" "Alan Bridle" "abridle
" nil "771" "" "^From:" nil nil "11"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA31264; Mon, 2 Nov 92 12:04:42 -0500
Message-Id: <9211021704.AA31264@polaris.cv.nrao.edu>
References: <9211012247.AA26834@NMSU.Edu>
From: abridle (Alan Bridle)
To: jburns@NMSU.Edu
Date: Mon, 2 Nov 92 12:04:42 -0500

Here's the revised (all>1) depolarization plot

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

From root Wed Nov 4 13:06:02 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
      ["957" "Wed" "4" "November" "92" "11:05:57" "MST" "jburns@NMSU.Edu"
"jburns@NMSU.Edu" nil "20" "Radio Galaxies Paper" "^From:" nil nil "11"])
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA29954; Wed, 4 Nov 92 13:06:02 -0500
Received: from NMSU.Edu (dns1.NMSU.Edu) by cv3.cv.nrao.edu (4.1/DDN-DLB/1.13)
      id AA14777; Wed, 4 Nov 92 13:06:03 EST
Received: from charon (charon.NMSU.Edu) by NMSU.Edu (4.1/NMSU-1.18)
      id AA17213; Wed, 4 Nov 92 11:05:58 MST
Message-Id: <9211041805.AA17213@NMSU.Edu>
Received: by charon (4.1/NMSU)
      id AA20510; Wed, 4 Nov 92 11:05:57 MST
From: jburns@NMSU.Edu
To: abridle@NRAO.EDU, rperley@aoc.nrao.edu
Subject: Radio Galaxies Paper
Date: Wed, 4 Nov 92 11:05:57 MST

Rick & Alan:

In the next E-mail, you will find another version of our RGs paper by Fernini et al. This is again a postscript file. (But, also for Alan, I'm sending along the tex file).

Most of the changes have been made in response to Alan's investigations of missing references & their consequences on the text.

Please have one last look at the paper. I think that it now must be very close. I'd like to incorporate any last changes that you have & submit the paper next week. So, I'd appreciate your comments by Monday, if possible.

I should note that although communication is difficult, I have been in touch with Ilias throughout this process. He has looked over & approved all the changes to date with some minor modifications. So, he does remain in the loop for the most part. I'll be sending him this latest version of the paper later today.

I'll look forward to getting your comments. Thanks once again for all your help.

Cheers,

Jack

From abridle Wed Nov 4 13:23:50 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
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nil "12" "Files" "^From:" nil nil "11"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA30159; Wed, 4 Nov 92 13:23:44 -0500
Message-Id: <9211041823.AA30159@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: jburns@nmsu.edu
Subject: Files
Date: Wed, 4 Nov 92 13:23:44 -0500

Hello Jack,

I got the .TEX file but not the .PS

I can make the .PS here if yuu like but I think I need a
setup.tex file. I've lost my old copy of Ilias' setup,
so if it's quicker to send me that than to send the .PS
please go ahead.

Cheers,
A.

From abridle Thu Nov 5 16:10:10 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
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nil "72" "Last iook at RG draft" "^From:" nil nil "11"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA05593; Thu, 5 Nov 92 16:09:10 -0500
Message-Id: <9211052109.AA05593@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: jburns@nmsu.edu, rperley
Subject: Last look at RG draft
Date: Thu, 5 Nov 92 16:09:10 -0500

Jack -- final comments from AHB:

Fig.1:
~~~~~~
a. This brings out strongly (maybe over-emphasizing through
saturation?) the compactness of F2-->F6 in 3C55. I wonder if there
is any chance that F2-->F6 is another double source projected against
3C55, with F2 and F6 as its hot spots? Are there any other optical
objects near the centroid of the F2-->F6 line?

b. The Figure is not mentioned in the text for 3C324 or 3C356, so these
panels are "orphaned". This is probably because the grey scales for
these sources add very little to the content of the paper, but I
don't think it's worth rearranging the Figure at this late stage.
Can we instead add the clause "and Figure 1 shows a grey scale image"
to the third sentence of para.1 of Sec 4.2.4 (3C 324) and to the
second sentence of para.1 of Sec 4.2.5 (3C 356)? That way the
reader who "dips into" the paper just at these sections will still be
made aware of these grey scales.
~~~~~~

Fig. captions:
~~~~~~~~~~~~~~
Everywhere: replace "peak flux is" with "peak flux density is".

p.18
~~~~

a) delete "optical" before "galaxy" on line 7. (It is surely there
   at other wavelengths!)
b) replace "spectrum" with "system" or "region" on line 13. (The spectrum
   cannot be described as extended, it's the gas that's extended?).

Minor English/style suggestions:
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Abstract, line 5/6. Change to:
"The jets in these RGs are less prominent, relative to the lobes, than
those in the quasar sample."

p.3, para.1, line 10   delete "of" after "all"

p.5, line 7   delete "of the" after "all"

p.7, line 9   Replace "With the exception of" by "Except for"

p.12, line 8   replace "which" by "that"

p.19, line 1   add "galaxy" after "which"

p.25, line 3   replace "which" by "that"

p.25, line 6   Replace "Subsequent" by "Later"

As you can tell from the minute nature of the last few comments, I'm
happy to donate this paper to the referee's in-tray now.

Any comment yet from Rick?

Cheers, A.
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

From abridle Fri Nov 6 09:02:31 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
      ["585" "Fri" "6" "November" "92" "09:02:24" "-0500" "Alan Bridle" "abridle "
nil "14" "Re: Last look at RG draft" "^From:" nil nil "11"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA14503; Fri, 6 Nov 92 09:02:24 -0500
Message-Id: <9211061402.AA14503@polaris.cv.nrao.edu>
References: <9211060202.AA02227@NMSU.Edu>
From: abridle (Alan Bridle)
To: jburns@NMSU.Edu
Subject: Re: Last look at RG draft
Date: Fri, 6 Nov 92 09:02:24 -0500

Rick sent me a quick message yesterday saying he'll get his comments to
you before he leaves for a week at Catltech on Monday. In case he
hasn't also told you this, I'll pass it on.

Thanks for doing the final legwork on this draft, it is looking much
better now. I was glad to hear that Ilias has been able to keep up
with the changes we have been making, too.

Robert is talking about making a visit to C'ville for a joint project
before long. If he does, I'll try also to use his visit as a chance
to get him to kick in his remaining pieces for the QSR paper.

Cheers, A.

From root Tue Nov 10 10:26:42 1992
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
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"jburns@NMSU.Edu" "<9211101526.NA07699@NMSU.Edu>" "13" "" "^From:" nil nil "11"])
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA28056; Tue, 10 Nov 92 10:26:41 -0500
Received: from NMSU.Edu (dns1.NMSU.Edu) by cv3.cv.nrao.edu (4.1/DDN-DLB/1.13)
      id AA14160; Tue, 10 Nov 92 10:26:42 EST
Received: from charon (charon.NMSU.Edu) by NMSU.Edu (4.1/NMSU-1.18)
      id AA07699; Tue, 10 Nov 92 08:26:38 MST
Message-Id: <9211101526.AA07699@NMSU.Edu>
Received: by charon (4.1/NMSU)
      id AA24783; Tue, 10 Nov 92 08:26:36 MST
From: jburns@NMSU.Edu
To: abridle@NRAO.EDU
Date: Tue, 10 Nov 92 08:26:38 MST

Subject: Fernini et al. Paper

Alan & Rick:
      Well, the RGs paper has finally been sent off to the journal
this morning. I made the final few minor changes suggested by Alan
& a few other minor corrections, then packaged it up for AJ. I
believe that we have a pretty good paper now, much better than what
we started off with. Thanks very much to both of you for your efforts.
      Hard copies of the final preprint are being sent to you both
as well & should arrive later this week.
      Cheers,
      Jack

From root Tue Nov 10 10:47:37 1992
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
["437" "Tue" "10" "November" "92" "08:47:36" "MST" "jburns@NMSU.Edu"
"jburns@NMSU.Edu" "<9211101547.AA13543@NMSU.Edu>" "11" "Preprint" "^From:" nil nil
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Received: from dns1.NMSU.Edu by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA26525; Tue, 10 Nov 92 10:47:35 -0500
Received: from charon (charon.NMSU.Edu) by NMSU.Edu (4.1/NMSU-1.18)
id AA13543; Tue, 10 Nov 92 08:47:36 MST
Message-Id: <9211101547.AA13543@NMSU.Edu>
Received: by charon (4.1/NMSU)
id AA25228; Tue, 10 Nov 92 08:47:35 MST
From: jburns@NMSU.Edu
To: abridle@polaris.cv.nrao.edu
Subject: Preprint
Date: Tue, 10 Nov 92 08:47:36 MST

Alan:
I'd like to put the paper in the NRAO preprint system,
but I would prefer to wait until we have the referee's comments
& have responded to these comments. This has been my general
policy in the past.
Now that the RGs paper has been sent off, I might be able
to help a bit more with the QSO paper. Please let me know if
there is anything useful that I can do --- although, I'm certainly
not looking for any work!
Cheers,
Jack

From abridle Tue Nov 10 11:09:58 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
["816" "Tue" "10" "November" "92" "11:09:51" "-0500" "Alan Bridle" "abridle "
nil "16" "Re: Preprint" "^From:" nil nil "11"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA15541; Tue, 10 Nov 92 11:09:51 -0500
Message-Id: <9211101609.AA15541@polaris.cv.nrao.edu>
References: <9211101547.AA13543@NMSU.Edu>
From: abridle (Alan Bridle)
To: jburns@NMSU.Edu
Subject: Re: Preprint
Date: Tue, 10 Nov 92 11:09:51 -0500

I fully agree re waiting for the referee's comments.

David, Colin and Robert all of have bits and pieces they said they
would add for the paper, and I'm guessing that I won't get Robert's
until he's here or David's until term is over. I've done the pruning
that you suggested and the main things that might be helpful would be
either to make more greyscale images or to put Table 9 (the
equipartition results) together. I will be able to do both of these
here but my limiting factor is time (as usual). I'm coming up to
a busy time with NRAO internal business (it's budget time, and
this is a terrible year coming up) and an upcoming visit from
Peter Scheuer's student to work with me on the spectral-asymmetry
data, so end-of-the-year is the likely period for the "penultimate"
draft to circulate.

Cheers, A.

From root Wed Dec 9 16:08:51 1992
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
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"jburns@NMSU.Edu" "<9212092108.AA11941@NMSU.Edu>" "14" "Referee's Report" "^From:"
nil nil "12"])
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA25670; Wed, 9 Dec 92 16:08:51 -0500
Received: from NMSU.Edu (dns1.NMSU.Edu) by cv3.cv.nrao.edu (4.1/DDN-DLB/1.13)
      id AA20083; Wed, 9 Dec 92 16:08:51 EST
Received: from charon (charon.NMSU.Edu)
 by NMSU.Edu (4.1/NMSU-1.18)
      id AA11941; Wed, 9 Dec 92 14:08:45 MST
Message-Id: <9212092108.AA11941@NMSU.Edu>
Received: by charon (4.1/NMSU)
      id AA23836; Wed, 9 Dec 92 14:08:45 MST
From: jburns@NMSU.Edu
To: abridle@NRAO.EDU, rperley@aoc.nrao.edu
Subject: Referee's Report
Date: Wed, 9 Dec 92 14:08:45 MST

Alan & Rick:

We have the referee's report back on the Fernini et al. paper. It is VERY favorable & very positive. There are just a few trivial suggestions for changes or additions.

I'd like to Fax this report to each of you. Can you please give me your current Fax numbers?

Paul Hodge suggests that we can get this paper included in the current issue of AJ that is being filled if we quickly get a revised manuscript back to him. I'd like to return it to him within a week which will be a challenge given that Final Exams start on Monday. But, I'm willing to have a go at it if you both can get me back input on the referee's report right away.

Thanks,

Jack

12/09/92 16:29

Astronomy Department
New Mexico State University
Box 30001/Dept. 4500
FAX Number (505) 646-1602

FACSIMILE COVER SHEET

DATE:

TRANSMIT TO: DR. Alan Bridle

COMPANY/INSTITUTION: NRAO

ADDRESS:

FAX NUMBER: 804-296-0278

****

TRANSMITTED FROM:

NAME: Jack Burns

DEPARTMENT: ASTRONOMY

ADDRESS: Box 30001/Dept. 4500

TELEPHONE NUMBER: (505) 646-4438

CHARGE TO ACCOUNT NUMBER: 45658

NUMBER OF PAGES: 2
(including this coversheet)

****

NOTES: Alan:

Here's the referee's report.

JB

DEC 0 9 1992

Astron. Jl. 920372 referee report (Fernini and Co.)

The issue of unification schemes for radio-loud objects is a topical one. The manuscript describes an important approach to / test for this scheme, namely the relative jet prominence. Two other relevant issues, the radio depolarization asymmetry and radio-optical asymmetries are also investigated.

This is a well written paper, asking simple questions and providing one simple answer. I look forward to subsequent articles on these studies, and have no objections against rapid publication in the Astronomical Journal. Specific comments are listed below. I do not need to see a revised version.

Specific (minor) comments:

As an illustration of the difficulty of detecting jets in luminous radio galaxies, the authors might wish to refer to the Cygnus-A jet discovery paper (Perley et al. 1984) already in their Introduction.

In addition, it may be worth mentioning that even at 90 degrees from the sight line relativistic jets will appear fainter than nonrelativistic jets.

I am curious as to how the redshift and linear size distributions of their QSR and RG samples compare, and would urge the authors to add a figure, or to comment on this issue in the text.

Finally: could the authors comment on the fact that 3C22, having the prominent jet, also has the highest core/total 5GHz flux density ratio and is not a particularly large source!

From abridle Fri Dec 11 13:40:35 1992
X-VM-v5-Data: ([nil nil nil nil nil nil t nil nil]
      ["1874" "Fri" "11" "December" "92" "13:40:31" "-0500" "Alan Bridle" "abridle
" nil "36" "Re: Referee's Report" "^From:" nil nil "12"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA37714; Fri, 11 Dec 92 13:40:31 -0500
Message-Id: <9212111840.AA37714@polaris.cv.nrao.edu>
References: <9212092108.AA11941@NMSU.Edu>
From: abridle (Alan Bridle)
To: jburns@NMSU.Edu
Subject: Re: Referee's Report
Date: Fri, 11 Dec 92 13:40:31 -0500

Seems straightforward enough apart from comment #3, which goes right
to the most flawed part of the sample as I see it!

Re comment #1, Cyg A is a well-known single example of course but the
statistics of the whole available set (including Cygnus) are in Fig.2
of the Bridle (1992) reference (AGN Paradigm paper). If we want to
emphasize the point, why not use both references?

I don't think comment #2 deserves much of a response. It's true of
course, but I would expect that it's also well understood by anyone
who follows these beaming discussions. I'm not sure where a clause
giving increased emphasis to this point might best be placed in the
paper. I'd be happy to ignore the comment, but if you guys want to
add something somewhere to draw attention to it that's also fine by me.
The "new student" readers may find it helpful.

Comment #3. A figure would be best, but time-consuming. Danger with
words is that it will sound like waffling (and sweeping something
under the rug). In an earlier iteration, both Rick and I were worried
that this sample _had_ been biased by the optical selection criterion,
so maybe some rug-sweeping is going on? Bottom line: I'm not sure
what to do about this, but others beside the referee will doubtless
spot this point and may plot the distributions up for themselves and
chastise us for them later. Better to be up front about any bias --
how well does the final sample correct the problem, Jack?

Comment 4: I'd like not to react to this. We've taken the attitude
that we want to wait until we have the statistics for the whole
sample before examining such questions, and I'm convinced that this
attitude is the "high ground". One source does not a correlation make,
or a unified model prove ...

Glad the overall report was so positive -- suggests that the time
spent on the makeover was well invested?

Cheers, A.

From root Wed Dec 16 22:45:27 1992
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
["1051" "Wed" "16" "December" "92" "20:45:23" "MST" "jburns@NMSU.Edu"
"jburns@NMSU.Edu" "<9212170345.AA13654@NMSU.Edu>" "23" "Revisions of RGs paper"
"^From:" nil nil "12"])
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id AA17620; Wed, 16 Dec 92 22:45:26 -0500
Received: from NMSU.Edu (dns1.NMSU.Edu) by cv3.cv.nrao.edu (4.1/DDN-DLB/1.13)
id AA05843; Wed, 16 Dec 92 22:45:25 EST
Received: from charon (charon.NMSU.Edu) by NMSU.Edu (4.1/NMSU-1.18)
id AA13654; Wed, 16 Dec 92 20:45:23 MST
Message-Id: <9212170345.AA13654@NMSU.Edu>
Received: by charon (4.1/NMSU)
id AA17217; Wed, 16 Dec 92 20:45:22 MST
From: jburns@NMSU.Edu
To: abridle@NRAO.EDU
Cc: jburns@NMSU.Edu
Subject: Revisions of RGs paper
Date: Wed, 16 Dec 92 20:45:23 MST

Alan:

I'm sending along a postscript file with the revised version of text for the Fernini et al. paper. I thought that you might like to have a quick glance at it. The changes to the text were minor, although I had to do a more painful reformatting of the Tables to meet the new AJ format (new Tables are not in this version of the ps file). You should note the following changes:
(1) p. 4, 2nd paragraph. Insert in parenthesis on strength of jet oriented in plane of sky.
(2) p. 5, 2nd paragraph. Comment on Cyg A added.
(3) p. 8, 2nd paragraph. This is a new paragraph which addresses referee's questions about RG vs. QSR sizes, etc.
(4) Bridle et al. (1992) changed everywhere to 1993.

Patrick Leahy was visiting with us on Friday. I gave him a copy of the paper to read. He noted a problem with the registration of the H-alpha image onto the radio in Fig. 8d. I am correcting this.

That's about it. Please let me know if you have any comments about the above changes. I'll try to get this out before X-mas next week.

Cheers,
Jack

From abridle Thu Dec 17 11:10:14 1992
X-VM-v5-Data: ([nil nil nil nil nil nil t nil nil]
      ["851" "Thu" "17" "December" "92" "11:10:04" "-0500" "Alan Bridle" "abridle "
nil "21" "Re: Revisions of RGs paper" "^From:" nil nil "12"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA27018; Thu, 17 Dec 92 11:10:04 -0500
Message-Id: <9212171610.AA27018@polaris.cv.nrao.edu>
References: <9212170345.AA13654@NMSU.Edu>
From: abridle (Alan Bridle)
To: jburns@NMSU.Edu
Subject: Re: Revisions of RGs paper
Date: Thu, 17 Dec 92 11:10:04 -0500

Hello Jack,

I've printed the .ps file out and will check it through tonight.
Today's too hectic for me to get to it.

Robert Laing is here at the moment and we were discussing some
aspects of the depolarization asymmetries -- he mentioned that
the radio-galaxy versus quasar "unsigned" asymmetry (i.e.
without regard to jet/counterjet lobe, as we are doing it here)
was a topic in a thesis by Gillian Holmes at Jodrell, and that
a short report on her results was in the proceedings of the
Paris Jet Meeting (eds Sol, Pelletier et al) this year.
Robert recalls that she did find the galaxy depolarization ratios
to be lower than those of the quasars in a carefully matched
sample. Maybe we should check this reference as we are saying
"no clear effect" in a small sample. We may be coming along too
late for that comment to be interesting?

A.

From root Fri Dec 18 12:36:35 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
["230" "Fri" "18" "December" "92" "10:36:27" "MST" "jburns@NMSU.Edu"
"jburns@NMSU.Edu" nil "7" "Re: Revisions of RGs paper" "^From:" nil nil "12"])
Received: from dns1.NMSU.Edu by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA15578; Fri, 18 Dec 92 12:36:34 -0500
Received: from charon (charon.NMSU.Edu) by NMSU.Edu (4.1/NMSU-1.18)
id AA11641; Fri, 18 Dec 92 10:36:27 MST
Message-Id: <9212181736.AA11641@NMSU.Edu>
Received: by charon (4.1/NMSU)
id AA14446; Fri, 18 Dec 92 10:36:26 MST
From: jburns@NMSU.Edu
To: abridle@polaris.cv.nrao.edu
Subject: Re: Revisions of RGs paper
Date: Fri, 18 Dec 92 10:36:27 MST

Alan:

I have not been able to locate either reference for Gillian Holmes in our library on campus. We have neither her thesis nor the particular proceedings of this Paris meeting. Might you have this in C'ville?

Cheers,

Jack

From abridle Fri Dec 18 13:34:26 1992
X-VM-v5-Data: ([nil nil nil nil nil nil t nil nil]
["991" "Fri" "18" "December" "92" "13:34:22" "-0500" "Alan Bridle" "abridle "
nil "25" "Re: Revisions of RGs paper" "^From:" nil nil "12"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA14600; Fri, 18 Dec 92 13:34:22 -0500
Message-Id: <9212181834.AA14600@polaris.cv.nrao.edu>
References: <9212181736.AA11641@NMSU.Edu>
From: abridled(Alan Bridle)
To: jburns@NMSU.Edu
Subject: Re: Revisions of RGs paper
Date: Fri, 18 Dec 92 13:34:22 -0500

The reference is to Roland, Sol & Pelletier (edsi, 7th IAP Meeting,
"Extragalactic Radio Sources - From Beams to Jets), published
by CUP in 1992, ISBN 0 521 41602 7.

The paper is "The Laing-Garrington Effect: Radio Depolarization
Asymmetry" by Conway, Garrington & Holmes, p.279-284.

In Fig.2 on p.280 they plot the unsigned DP ratio for 13 QSS
with 0.3 < z < 1 and 23 RGs in the same z range, and claim
that the histogram for the RG's has more values close to 1
than that for the QSRs. Both are binned so that the
average occupancy is about 2.5 sources/bin so it's not above
all criticism, but we should probably at least refer to
their claim in our paper.

Interestingly, the largest DP ratios they find in this group are
for RGs not QSRs, and the spreads definitely overlap.

Looks like a case where "more statistics are needed"
but we should refer to their result as it is published.

I'm still trying to track down Holmes' thesis. which may
exist somewhere at the NRAO.

Cheers, A.

From root Fri Dec 18 16:04:59 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
["443" "Fri" "18" "December" "92" "14:04:57" "MST" "jburns@NMSU.Edu"
"jburns@NMSU.Edu" nil "10" "Re: Revisions of RGs paper" "^From:" nil nil "12"])
Received: from dns1.NMSU.Edu by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA14955; Fri, 18 Dec 92 16:04:58 -0500
Received: from charon (charon.NMSU.Edu) by NMSU.Edu (4.1/NMSU-1.18)
id AA06756; Fri, 18 Dec 92 14:04:58 MST
Message-Id: <9212182104.AA06756@NMSU.Edu>
Received: by charon (4.1/NMSU)
id AA19253; Fri, 18 Dec 92 14:04:56 MST
From: jburns@NMSU.Edu
To: abridle@polaris.cv.nrao.edu
Subject: Re: Revisions of RGs paper
Date: Fri, 18 Dec 92
14:04:57 MST

Alan:
Thanks for the reference. I will include it and a comment
on their results in the final version of the paper.

By the way, do you have any comments on the few small changes I made in response to the referee. The rest of the paper has now been put together. We have reformatted tables and some new versions of Fig. 1a and Fig. 8d. As soon as I get your last comments, I'll package up the paper and send it back to AJ.

Cheers,

Jack

From root Fri Dec 18 16:56:10 1992
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
["621" "Fri" "18" "December" "92" "14:56:11" "MST" "jburns@NMSU.Edu"
"jburns@NMSU.Edu" "<9212182156.AA20277@NMSU.Edu>" "14" "Confused" "^From:" nil nil
"12"])
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA15598; Fri, 18 Dec 92 16:56:09 -0500
Received: from NMSU.Edu (dns1.NMSU.Edu) by cv3.cv.nrao.edu (4.1/DDN-DLB/1.13)
id AA06225; Fri, 18 Dec 92 16:56:13 EST
Received: from charon (charon.NMSU.Edu) by NMSU.Edu (4.1/NMSU-1.18)
id AA20277; Fri, 18 Dec 92 14:56:11 MST
Message-Id: <9212182156.AA20277@NMSU.Edu>
Received: by charon (4.1/NMSU)
id AA19837; Fri, 18 Dec 92 14:56:10 MST
From: jburns@NMSU.Edu
To: abridle@NRAO.EDU
Subject: Confused
Date: Fri, 18 Dec 92 14:56:11 MST

Alan:

I'm a little confused by your last E-mail. I seemed to have deleted your previous message which might have helped me untangle your last one. In any event, let me ask the following questions:

(1) The Roland et al. reference is in regard to the depolarization asymmetry issue? What did they say in this paper?

(2) The Conway et al. reference was incomplete. Is this MNRAS? What volume & year? I wasn't able to quickly locate it in our library here but several issues were out.

Sorry to look so confused but it's been a very hectic week with finals, fiscal problems, telescope construction, etc.

Cheers,

Jack

From abridle Fri Dec 18 17:04:35 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
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nil "14" "Re: Confused" "^From:" nil nil "12"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA16416; Fri, 18 Dec 92 17:04:28 -0500
Message-Id: <9212182204.AA16416@polaris.cv.nrao.edu>
References: <9212182156.AA20277@NMSU.Edu>
From: abridle (Alan Bridle)
To: jburns@NMSU.Edu
Subject: Re: Confused
Date: Fri, 18 Dec 92 17:04:28 -0500

There is only one reference. It is by Conway et al. at the
page numbers in my message, in the conference proceedings
edited by Roland et al.

i.e. I was sending you the book information so you could pursue
it with your Librarian, followed by the
paper details releveant to our own discussion.

I'll try to look through your changes tonight. We were
working very late last night, on the spectral-asymmetry reductions.
Have to get these finished while Robert is here, but I'll try to
send you comments by E-mail some time Saturday.

Cheers, A.

From root Sat Dec 19 14:50:01 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
["696" "Sat" "19" "December" "92" "12:49:57" "MST" "jburns@NMSU.Edu"
"jburns@NMSU.Edu" nil "16" "New Paragraph" "^From:" nil nil "12"])
Received: from cv3.cv.nrao.edu by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA15833; Sat, 19 Dec 92 14:50:00 -0500
Received: from NMSU.Edu (dns1.NMSU.Edu) by cv3.cv.nrao.edu (4.1/DDN-DLB/1.13)
id AA21926; Sat, 19 Dec 92 14:49:59 EST
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id AA27391; Sat, 19 Dec 92 12:49:57 MST
Message-Id: <9212191949.AA27391@NMSU.Edu>
Received: by charon (4.1/NMSU)
id AA27731; Sat, 19 Dec 92 12:49:56 MST
From: jburns@NMSU.Edu
To: abridle@NRAO.EDU
Subject: New Paragraph
Date: Sat, 19 Dec 92 12:49:57 MST

Alan:

Let me suggest the following paragraph to be added at the end of Section 5 (p. 22) to address the Conway et al. (1992) result.

Recently, Conway et al. (1992) examined the depolarization ratios for 13 QSRs and 23 RGs within a redshift range of $0.3<z<1$. They report that the RGs have more values closer to 1 than the QSRs. Since our preliminary result seems to conflict with that of Conway et al., it is clear that better statistics are needed before a definitive conclusion on this issue can be reached.

By the way, do you have any additional details on this reference (i.e., page #, vol. #)? As I mentioned before, our library on campus doesn't seem to have this book.

Cheers,
Jack

From abridle Mon Dec 21 13:17:03 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
["3599" "Mon" "21" "December" "92" "13:16:43" "-0500" "Alan Bridle" "abridle
" nil "76" "Comments" "^From:" nil nil "12"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
id AA18704; Mon, 21 Dec 92 13:16:43 -0500
Message-Id: <9212211816.AA18704@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: jburns@nmsu.edu
Subject: Comments
Date: Mon, 21 Dec 92 13:16:43 -0500

p.5 Adding the Perley et al - Cyg A comment to sentence 2 of para.2 doesn't actually address there referee's point (he/she thought this was a good example of the problem of detecting faint jets in radio galaxies) and stuffs the next sentence, which begins "This study ...." and refers only to the quasars and to the B et al. study.

I therefore suggest we go back to the original wording on p.5, and instead try to kill two of the referee's small birds with one stone on p.4. Why not take the segment starting on line 10 of p.4, and make it:

"In FRII radio galaxies, whose jets should be systematically nearer to the plane of the sky, the emission of neither jet should be strongly beamed towards the observer. (Indeed, for galaxies whose jets are close to the plane of the sky, relativistic beaming may make both jets apparently fainter than they would appear if their velocities were nonrelativistic). FRII quasars should therefore tend to have jets that are more prominent relative to their lobes than those in the radio galaxies (whose jets are known to be hard to detect, e.g. Perley et al. 1984). The {\it counter}jets should however be easier to detect in the radio galaxies, and the jet/counterjet ratios should be systematically higher in qusars than in radio galaxies. The {\t relative prominence} (integrated flux density ratios) of jets, counterjets and lobes in extended radio galaxies and quasars can therefore provide several good tests for unified schemes such as Barthel's if relativistic beaming effects are dominant (see also Bridle 1992).

I think this makos all the points, and is also more comprehensible than the referee's "even for jets oriented 90 degrees to the line of sight" line, which is both ungrammatical and strange -- why say "even" when referring to the *worst* case?

p.8 It's the average *linear* size that the referee was asking about, not the angular size. We seem to be dodging still at this point. What are the linear size statistics - I thought we actually had an RG sample that was statistically smaller in projected linear size than the QSR sample, rather than the "correct" way round?

Re 3C22: Robert Laing commented to me that he thinks this is a broad-line radio galaxy. If that's right, this an an interesting transition case and we ought to mention that. I'd like to look up the optical spectrum reference to check that out, but won't have time to do that until Robert leaves this evening.

Re the Conway et al. addendum:

Conway etl. (1992) examined the unsigned depolarization ratios for 13 QSrs and 23 RGs at red shifts in the range $0.3 < z < 1$. They found that the histogram of depolarization ratios had more values close to 1.0 for the radio galaxies than for the quasars, suggesting that the depolarization asymmetry is weaker for the galaxies. As our own, albeit smaller, sample does not confirm this effect, we believe that better statistics may be needed before a definitive conclusion is reached on this issue.

The Conway et al. reference (sorry, I thought I had sent this twice already) is:

Conway, R.G., Garrington, S.T. and Holmes, G.F. (1992) in "Extragalactic Radio Sources - From Beams to Jets", Proc. 7th IAP Meeting (eds. Roland, J., Sol, H and Pelletier, G.; Cambridge University Press), p. 279-284.

Have to disappear now -- we're working furiously on the spectral and depolarization asymmetry stuff from the quasar group before Robert catches his plane back to the U.K. this evening.

I'll look into the 3C22 situation tomorrow a.m. if you leave me the time for that ...

Cheers, A.

From root Mon Dec 21 19:05:18 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
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id AA32103; Mon, 21 Dec 92 19:05:18 -0500
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id AA24473; Mon, 21 Dec 92 19:05:19 EST
Received: from charon (charon.NMSU.Edu) by NMSU.Edu (4.1/NMSU-1.18)
id AA17385; Mon, 21 Dec 92 17:05:16 MST
Message-Id: <9212220005.AA17385@NMSU.Edu>
Received: by charon (4.1/NMSU)
id AA15064; Mon, 21 Dec 92 17:05:16 MST
From: jburns@NMSU.Edu
To: abridle@NRAO.EDU
Subject: Comments
Date: Mon, 21 Dec 92 17:05:16 MST

Alan:

Thanks for your comments on my additions. I've made most of your suggested changes. I'll await your final input on 3C 22.

As for the statistics, I prefer to leave in the new paragraph which does address angular sizes. It doesn't really matter whether or not it is angular or linear sizes in this case since the redshift interval is the same; we did point out that the angular distributions are somewhat different for the RGs vs QSRs. This should be sufficient for the purposes of this paper & to placate the referee. I'm just not prepared (or willing) to say anything further at this time until we have the full sample better defined in a future paper -- we open up a can of worms that cannot be properly addressed until later.

Cheers,

Jack

From abridle Tue Dec 22 11:17:01 1992
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
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nil "11" "3C22" "^From:" nil nil "12"])
Received: by polaris.cv.nrao.edu (AIX 3.1/UCB 5.61/1.0)
          id AA13606; Tue, 22 Dec 92 11:16:52 -0500
Message-Id: <9212221616.AA13606@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: jburns@,msu.edu
Subject: 3C22
Date: Tue, 22 Dec 92 11:16:52 -0500

I just sent you a .ps file with the spectrum of 3C22 from Perryman, Lilly, Longair & Downes (MN 209, 611 (1984). They call this a strong narrow-line system, but the lines seem to me to be broader than those of the other RGs in their sample, FWHM maybe 3000 km/s? Take a look yourself and see what you think. Robert recalls that Spinrad thinks this has broad H-beta lines but I can't find any Spinrad reference actually saying that. Robert said he would look at his notes when he got back to Cambridge (he flew back yesterday evening).

Cheers, A.

From abridle Tue Dec 22 14:18:30 1992
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          id AA17697; Tue, 22 Dec 92 14:18:20 -0500
Message-Id: <9212221918.AA17697@polaris.cv.nrao.edu>
References: <9212221647.AA17533@NMSU.Edu>
From: abridle (Alan Bridle)
To: jburns@NMSU.Edu
Subj ct: Re: 3C22
Date: Tue, 22 Dec 92 14:18:20 -0500

Well, broad lines in this object could be quite significant if they were real, as this is the only clear jet in our sample. They would make 3C22 the most quasar-like of the sample optically. But I'd prefer to get a diagnosis of the Perryman et al. spectrum from someone like yourself who is used to looking at such things, rather than to superpose my own views on their data. They lumped it in with other objects as a "bright-line narrow" system. It is really this Spinrad reference that Robert *thought* he remembered that may have actually described the H-beta line as "broad".

The .ps file is slow to plot on my printer, but does actually produce an output. If it's actually hanging on yours, might it be just as quick to take a look directly at Perryman et al.'s figure in MN and decide for yourself? I'll resend the file so you can try again in any case, however.

I'd prefer not to reference the Perryman spectrum and then contradict their classification without some further confirmation, either from you or from Robert. So I think: if in doubt, leave it out, rather than modifying our paper as described in your last message on the basis of my reading of the spectrum alone.

We may try to discuss the optical spectra anyway in the QSR paper, as we also have the intriguing fact that 3C68.1, the QSR with the most galaxy-like jets and a weak core, is one of the notorious "red quasars" which may really be galaxies. The idea that 3C22 might be a rather QSR-like galaxy and 3C68.1 a galaxy-like QSR is something that Robert and I can work on before the QSR paper goes off.

On that topic, a byproduct of the AL270 run in November and of our big data push here last week is that we now have the depolarization asymmetries for all of the extended sources in the QSR sample at 1.3" resolution. Robert and I both think these asymmetries should go into the main QSR paper, and if Peter agrees that will be easy to do -- all of the depolarization images were made yesterday and we have all of the results in hand, so it won't delay it at all.

Interestingly, 3C263 turns out to be "backwards" -- counterjet side less depolarized! It is also the only one to show a strong spectral index asymmetry -- also exactly backwards from the Liu/Pooley result! We now think that 3C263 may be an example of a source with an exceptionally strong intrinsic asymmetry related to its unusually large arm-length asymmetry.

This is all starting to fit together rather nicely in terms of the usual relativistic beaming model plus an intrinsic asymmetry that goes

with arm length and which is seen clearly in the RGs. More of that when you're back from your vacation ....

Have a good one!

A.

From root Tue Jan 12 16:52:52 1993
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
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"jburns@NMSU.Edu" "<9301122152.AA00429@NMSU.Edu>" "11" "Fernini et al. paper"
"^From:" nil nil "1"])
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id AA10922; Tue, 12 Jan 93 16:52:53 EST
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id AA00429; Tue, 12 Jan 93 14:52:47 MST
Message-Id: <9301122152.AA00429@NMSU.Edu>
Received: by charon (4.1/NMSU)
id AA03566; Tue, 12 Jan 93 14:52:46 MST
From: jburns@NMSU.Edu
To: abridle@NRAO.EDU, rap@phobos.caltech.edu
Subject: Fernini et al. paper
Date: Tue, 12 Jan 93 14:52:47 MST

Alan & Rick:

Just wanted to let you know that the Fernini et al. paper has now been formally accepted by AJ. It will appear in the May issue.

Alan, at one point, you volunteered to put this paper out as an NRAO preprint. I'd like to do this now if the offer still stands. Would you like me to E-mail you a copy of the Tex file & then you could single-space it or otherwise reformat it to fit in the preprint series?

Cheers,

Jack

From root Tue Jan 12 17:05:02 1993
X-VM-v5-Data: ([nil nil nil nil t nil nil nil nil]
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id AA11228; Tue, 12 Jan 93 17:05:05 EST
Received: from charon (charon.NMSU.Edu) by NMSU.Edu (4.1/NMSU-1.18)
id AA03916; Tue, 12 Jan 93 15:04:57 MST
Message-Id: <9301122204.AA03916@NMSU.Edu>
Received: by charon (4.1/NMSU)
id AA04007; Tue, 12 Jan 93 15:04:56 MST
From: jburns@NMSU.Edu
To: abridle@NRAO.EDU
Subject: Page Charges
Date: Tue, 12 Jan 93 15:04:57 MST

Alan:

One more item on the paper. Could you see if NRAO would be willing to pay 50% of the page charges for this paper since there are 2 NRAO authors? I need to send in this page authorization form.

Thanks,

Jack

From abridle Tue Jan 12 17:22:13 1993
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
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          id AA28918; Tue, 12 Jan 1993 17:22:04 -0500
Message-Id: <9301122222.AA28918@polaris.cv.nrao.edu>
References: <9301122152.AA00429@NMSU.Edu>
From: abridle (Alan Bridle)
To: jburns@NMSU.Edu
Subject: Re: Fernini et al. paper
Date: Tue, 12 Jan 1993 17:22:04 -0500

Good news. If you send me the .TEX file I'll take it from there.

Would be nice to have a FITS tape with the images at some point,
also.

Thanks, A.

From abridle Tue Jan 12 17:24:20 1993
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
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          id AA14875; Tue, 12 Jan 1993 17:24:17 -0500
Message-Id: <9301122224.AA14875@polaris.cv.nrao.edu>
References: <9301122204.AA03916@NMSU.Edu>
From: abridle (Alan Bridle)
To: jburns@NMSU.Edu
Subject: Re: Page Charges
Date: Tue, 12 Jan 1993 17:24:17 -0500

Yes, NRAO will pay 50%. Please send a copy of the authorization
form directly to Ellen Bouton, Librarian, NRAO-CV.

Thanks.

From abridle Tue Jan 19 16:00:39 1993
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
      ["182" "Tue" "19" "January" "1993" "16:00:27" "-0500" "Alan Bridle" "abridle
" nil "7" "Typo" "^From:" nil nil "1"])
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
          id AA35415; Tue, 19 Jan 1993 16:00:27 -0500
Message-Id: <9301192100.AA35415@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: jburns@nmsu.edu
Subject: Typo
Date: Tue, 19 Jan 1993 16:00:27 -0500

In the RG paper, refs, line 7. should be "Urry" not "Urray"

I'll correct it in the preprint which I'm now formatting. Can
be fixed when the proofs come for the paper itself.

A.

From root Tue Jan 19 16:10:39 1993
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
["53" "Tue" "19" "January" "93" "14:10:36" "MST" "jburns@NMSU.Edu"
"jburns@NMSU.Edu" nil "3" "Re: Typo" "^From:" nil nil "1"])
Received: from dns1.NMSU.Edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
id AA25231; Tue, 19 Jan 1993 16:10:37 -0500
Received: from charon (charon.NMSU.Edu) by NMSU.Edu (4.1/NMSU-1.18)
id AA05616; Tue, 19 Jan 93 14:10:36 MST
Message-Id: <9301192110.AA05616@NMSU.Edu>
Received: by charon (4.1/NMSU)
id AA14106; Tue, 19 Jan 93 14:10:36 MST
From: jburns@NMSU.Edu
To: abridle@polaris.cv.nrao.edu
Subject: Re: Typo
Date: Tue, h9 Jan 93 14:10:36 MST

Alan:
Thanks. I'll correct it in the proofs.
Jack

From abridle Tue Jan 19 17:02:37 1993
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
      ["313" "Tue" "19" "January" "1993" "17:02:28" "-0500" "Alan Bridle" "abridle
" nil "9" "Figures" "^From:" nil nil "1"])
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
          id AA14829; Tue, 19 Jan 1993 17:02:28 -0500
Message-Id: <9301192202.AA14829@polaris.cv.nrao.edu>
From:
 abridle (Alan Bridle)
To: jburns@nmsu.edu
Subject: Figures
Date: Tue, 19 Jan 1993 17:02:28 -0500

I have the preprint text reformatted and ready.

I seem to recall you mentioned that one of the Figures had been
changed after a comnment by Paddy Leahy. I don't
have the new Figure. If the change is important and should
be in the preprint can you send me the updated version as
soon as convenient?

Thanks, A.

From root Tue Jan 19 17:17:05 1993
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
      ["66" "Tue" "19" "January" "93" "15:17:02" "MST" "jburns@NMSU.Edu"
"jburns@NMSU.Edu" nil "3" "Re: Figures" "^From:" nil nil "1"])
Received: from dns1.NMSU.Edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
          id AA27542; Tue, 19 Jan 1993 17:17:04 -0500
Received: from charon (charon.NMSU.Edu) by NMSU.Edu (4.1/NMSU-1.18)
      id AA22042; Tue, 19 Jan 93 15:17:02 MST
Message-Id: <9301192217.AA22042@NMSU.Edu>
Received: by charon (4.1/NMSU)
      id AA15114; Tue, 19 Jan 93 15:17:02 MST
From: jburns@NMSU.Edu
To: abridle@polaris.cv.nrao.edu
Subject: Re: Figures
Date: Tue, 19 Jan 93 15:17:02 MST

Alan:
      I'll drop a copy of all the figures in today's mail.
      Jack

From abridle Fri Mar 12 14:37:32 1993
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
["239" "Fri" "12" "March" "1993" "14:37:25" "-0500" "Alan Bridle" "abridle "
nil "9" "Images from our RG paper" "^From:" nil nil "3"])
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
id AA17350; Fri, 12 Mar 1993 14:37:25 -0500
Message-Id: <9303121937.AA17350@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: jburns@nmsu.edu
Subject: Images from our RG paper
Date: Fri, 12 Mar 1993 14:37:25 -0500

Hello Jack,

It would be very useful to have the images (all bands) for the RGs
from our paper available in digital form. Is there a FITS tape that
you could have someone copy and send to me? If so, I would be much
obliged.

Thanks, A.

From abridle Fri Mar 12 15:41:55 1993
X-VM-v5-Data: ([nil nil nil nil nil nil nil nil nil]
["426" "Fri" "12" "March" "1993" "15:41:52" "-0500" "Alan Bridle" "abridle "
nil "9" "DP asymm in 3C324" "^From:" nil nil "3"])
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)
id AA21550; Fri, 12 Mar 1993 15:41:52 -0500
Message-Id: <9303122041.AA21550@polaris.cv.nrao.edu>
From: abridle (Alan Bridle)
To: jburns@nmsu.edu
Subject: DP asymm in 3C324
Date: Fri, 12 Mar 1993 15:41:52 -0500

I'm looking at a few things to do with DP asymmetries, and was
struck again by the discrepancy between our DP asymmetry for
3C324 and the Pedelty and Conway et al. data for the same
source. Our own Figure 5c also shows significant polarization
left in the NE lobe at 20cm. Are you quite sure that the
relatively strong depolarization claimed in Table 7 isn't
a well-propagated typo? (Just getting a bit nervous ....)

A.