

From abridle Wed Oct 13 12:54:10 1993  
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"^From:" nil nil "10"])  
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)  
id AA33077; Wed, 13 Oct 1993 12:51:55 -0400  
Message-Id: <9310131651.AA33077@polaris.cv.nrao.edu>  
From: abridle (Alan Bridle)  
To: dhough@physics.Trinity.EDU, cjl@wells.haystack.edu, jburns@nmsu.edu,  
rl@rgosc.ast.cam.ac.uk  
Subject: Poster for AAS?  
Date: Wed, 13 Oct 1993 12:51:55 -0400

Hello again all,

I'd like to suggest that we submit an abstract for a poster paper at the Washington DC AAS meeting (January 1994) in which we would feature our main statistical results from the QSR paper that encourage "tired jet" models.

I'd suggest the title "Tired Jets in Extended 3CR Quasars?" and the basic content:

- o Correlation of counterjet detection with jet bending (and, but less prominently, morphological indicators of interactions)
- o Anticorrelation of hot spot prominence with jet bending
- o Correlation between straight jet prominence (but not total or bent jet prominence) with mas-scale central feature prominence.

plus a panel indicating how this might all make sense if jets are interacting and slowing down on the way out.

(i.e. essentially Figs 44-46 of our paper, maybe with a small montage of jet images, and some very elementary discussion emphasizing that this is a small sample and that these effects ought to be chased down in bigger ones)

Abstracts are due Oct.22, so let me know soon if you would like to have this done and I'll draft the necessary submission.

I'd take the responsibility for putting the poster itself together, but of course you'd be welcome to join in that part of the "fun" if you want to! I'd do it in PostScript files so you could pre-screen it across the E-net.

Who's planning on going to the meeting?

A.

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"AAS / Sec. 5.6 / Table 19" "^From:" nil nil "10"])

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with TCP; Wed, 13 Oct 93 15:01:51 CDT

Received: by physics.Trinity.EDU (4.1/SMI-4.1)

id AA11509; Wed, 13 Oct 93 14:59:05 CDT

Message-Id: <9310131959.AA11509@physics.Trinity.EDU>

From: dough@physics.Trinity.EDU (David Hough)

To: abridle@polaris.cv.nrao.edu

Subject: AAS / Sec. 5.6 / Table 19

Date: Wed, 13 Oct 93 14:59:05 CDT

San Antonio, TX  
October 13, 1993

Dear Alan:

(1) Yes, I think a AAS poster is a fine idea. I don't know how likely it is that I'll attend the meeting, probably not very.

(2) In the new Section 5.6 I sent yesterday, there might be room to squeeze in one more point. In the last paragraph, I dismiss the Qx-Sobno, QTbhs-Sobno, and Qx-QTbhs correlations without any mention of possible physical interpretation. At least on the first one, which is the strongest of the three (with or without 3C68.1 & 3C351), there was a point Colin made about this some time back. Larger lobe flux ratios seem to be correlated with larger inhomogeneity differences between the lobes, in the sense that the brighter lobe has its "extra" power not just on a higher "plateau", but concentrated in lumps. In brief, maybe there is a tendency for brighter lobes to have more local brightness enhancements (ridges, filaments, arcs, etc.). The only catch is the similar test with the structure function (Qx-Strno) really DOES depend entirely on 68.1 & 351; the correlation just vanishes without them. So how prepared are we (Colin?) to defend strong differences between what the Sob & Str are measuring, and thus make even a tentative statement about Colin's effect?

(3) Here is my final effort at Table 19. It now includes all columns that could conceivably be interesting in my opinion, slightly rearranged in a couple spots as well for better organization. Table 21 is cooking right now, should follow shortly.

\*\*\*\*\*

Table 19 - Linear-correlation Coefficients, r, for Correlation  
Tests of Prominences with Other Physical Parameters

\ Parameter										
\-----\ Prominence \	eta1c	eta2c	eta3c	eta1l	eta2l	eta3l	LLS	Qlob	Qx	Spread_j
Fcf,B,jx	0.02	0.00	0.03	0.12	-0.48	-0.59	-0.23	-0.66	-0.68	-0.56
Fjst,B,jx	0.09	0.10	0.09	0.23	-0.22	-0.38	-0.44	-0.71	-0.69	-0.33

Fjbt,jx	0.47	0.41	0.19	0.58	0.57	0.43	-0.53	-0.48	-0.48	-0.40
Fj,B,jx	0.51	0.45	0.20	0.68	0.55	0.33	-0.59	-0.55	-0.54	-0.37
Fjh,jx	-0.68	-0.77	-0.83	-0.37	-0.28	-0.07	-0.22	0.21	-0.04	-0.21
Fcj,x	0.31	0.31	0.38	0.29	0.38	0.43	-0.05	-0.38	-0.30	-0.41
Fcjh,cjx	-0.20	-0.17	-0.22	0.01	-0.10	-0.07	-0.24	-0.41	-0.20	-0.45

\ Parameter

\-----\ Colljh Qhs Qcomphs QTbhs Qarhs Qarx Sobhs Strhs Sobno Strno  
Prominence \

Fcf,B,jx	0.45	-0.50	0.53	-0.59	-0.22	-0.01	-0.49	-0.55	-0.58	-0.65
Fjst,B,jx	0.50	-0.52	0.64	-0.70	-0.31	0.04	-0.56	-0.67	-0.53	-0.69
Fjbt,jx	0.55	-0.41	0.01	-0.46	0.17	0.18	-0.34	-0.22	-0.51	-0.16
Fj,B,jx	0.54	-0.44	0.20	-0.58	0.09	0.14	-0.43	-0.35	-0.55	-0.30
Fjh,jx	-0.12	0.42	0.24	0.18	0.26	-0.36	0.28	0.32	-0.07	0.10
Fcj,x	0.47	-0.40	-0.20	-0.27	-0.33	-0.11	-0.29	-0.05	-0.29	-0.16
Fcjh,cjx	0.54	-0.73	-0.02	-0.56	0.03	0.30	-0.43	-0.24	-0.23	0.11

Note - For a 13 source sample,  $|r|=0.73$  corresponds to  $P(r)=0.5\%$ ,  
 $|r|=0.68$  to  $P(r)=1.0\%$ , and  $|r|=0.55$  to  $P(r)=5.0\%$ , where  
 $P(r)$  is the probability that two uncorrelated variables would  
by chance yield the given  $|r|$ .

\*\*\*\*\*

-Dave

From root Wed Oct 13 13:14:31 1993

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Poster for AAS?" "^From:" nil nil "10"])

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id AA06402; Wed, 13 Oct 93 11:14:15 MDT

From: jburns@NMSU.Edu

To: abridle@polaris.cv.nrao.edu

Subject: Re: Poster for AAS?

Date: Wed, 13 Oct 93 11:14:22 MDT

Alan:

We're looking forward to your visit here on Nov. 12th. We already have a colloquium scheduled in the afternoon on the 12th, but maybe we could have you give an informal lunch time talk. Would you be willing to do this? Also, would you like me to make hotel reservations for you on Thursday & Friday nights? Will Mary be joining you?

Finally, a poster at the AAS is a great idea. I will be there to support the effort in any way that I can.

Cheers,

Jack

From root Mon Oct 18 11:58:42 1993

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(1.37.109.4/16.2) id AA15770; Mon, 18 Oct 93 11:56:21 -0400

In-Reply-To: <9310181555.AA26209@polaris.cv.nrao.edu>; from "Alan Bridle" at Oct 18, 93 11:55 am

Mailer: Elm [revision: 70.85]

From: Colin Lonsdale <cjl@dopey.haystack.edu>

To: abridle@polaris.cv.nrao.edu

Subject: Re: AAS abstract suggestion

Date: Mon, 18 Oct 93 11:56:21 EDT

Looks good to me. Go for it. I have only a moderate probability of meeting attendance, by the way.

Colin

From root Mon Oct 18 13:08:04 1993

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id AA22916; Mon, 18 Oct 93 11:08:03 MDT

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Received: by charon (4.1/NMSU)

id AA08680; Mon, 18 Oct 93 11:08:02 MDT

From: jburns@NMSU.Edu

To: abridle@polaris.cv.nrao.edu

Subject: Re: AAS abstract suggestion

Date: Mon, 18 Oct 93 11:08:03 MDT

Alan:

I also think the abstract looks quite good. There is one sentence that seems to have a problem, however. It is the 1st sentence in the last paragraph. The part of the sentence that is confusing is "flows through the parsec-scale radio features jets are highly... It seems that "jets" is unnecessary here.

Otherwise, it's great. Let's send it off.

Cheers,

Jack

From root Mon Oct 18 13:44:44 1993  
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From: rl@mail.ast.cam.ac.uk (Robert Laing)  
To: abridle@polaris.cv.nrao.edu  
Subject: Abstract  
Date: Mon, 18 Oct 93 18:44 BST

Alan,

I've added a couple of sentences about sidedness of jets and fine-scale structure in hot-spots, since that wasn't mentioned. Otherwise fine.

Robert

P.S. When are you planning to be in Socorro?

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

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

%

% American Astronomical Society electronic abstract form.

% Meeting #183, January 11-14, 1994

%

% Abstract DEADLINE: October 23, 1993

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

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%\session{ }{ }

% In many of the commands that follow, sample information has been

% entered between the curly braces {}. You should delete this text

% and replace it with your own correct information. Please refer

% to the instructions if you have any questions.

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\firstauthor{A.H.Bridle} % REQUIRED

%\sponsor{} % OPTIONAL

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

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\author{A.H.Bridle}
\affil{NRAO}
\author{D.H.Hough}
\affil{Trinity University}
\author{C.J.Lonsdale}
\affil{Haystack Obs.}
\author{J.O.Burns}
\affil{NMSU}
\author{R.A.Laing}
\affil{RGO}
\begin{abstract}
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We have imaged 13 extended 3CR quasars with high sensitivity and resolution using the VLA at 4.9 GHz. We find a strong correlation between the prominence (relative to the extended emission) of the milli-arc-second scale central features and of the inner, straight segments of the radio jets. The outer, bent, jet segments do not share this correlation, however. Jet bending also favors the detection of counterjet candidates, and inhibits the formation of prominent hot spots. Counterjet candidates are found preferentially in the outer parts of the sources, and there is no evidence that their prominence anti-correlates with that of the jets, as it would if relativistic beaming controls the jet/counterjet asymmetry far from the quasar. There is, however, a strong tendency for the inner jets and the smallest-scale structure in the hot-spots to have the same sidedness.

These data favor "`tired jet" models in which the flows through the parsec-scale radio features jets are highly relativistic but those in larger-scale jets are only mildly relativistic. Further decreases in jet velocity on kiloparsec scales may then (a) allow the jets to bend, (b) allow counterjets to become more visible, and (c) reduce the jets' ability to form compact hot spots. The correlation between jet and compact hot-spot sidedness suggests that some portion of the jet flow maintains a mildly relativistic speed on large scales.

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P.S. Nothing about the NATO grant yet .. I'll let you know if I hear anything.



From root Mon Oct 18 14:40:43 1993

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"<9310181836.AA14695@physics.Trinity.EDU>" "8" "AAS Abstract" "^From:" nil nil "10"])

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with TCP; Mon, 18 Oct 93 13:40:33 CDT

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id AA14695; Mon, 18 Oct 93 13:36:34 CDT

Message-Id: <9310181836.AA14695@physics.Trinity.EDU>

From: dthough@physics.Trinity.EDU (David Hough)

To: abridle@polaris.cv.nrao.edu

Subject: AAS Abstract

Date: Mon, 18 Oct 93 13:36:34 CDT

A.,

I have nothing to add to the abstract, after consideration of the forwarded comments of the other three co-authors. I haven't much time to let it "sink in" today and see if any second thoughts occur to me, but don't wait on me - go ahead and send it in. I'll send second thoughts just for the record tomorrow, once I come up for air...

-D.



Robert's version continues:

- > These data favor "tired jet" models in which the flows through the
- > parsec-scale radio features jets are highly relativistic but those in
- > larger-scale jets are only mildly relativistic. Further decreases in
- > jet velocity on kiloparsec scales may then (a) allow the jets to bend,
- > (b) allow counterjets to become more visible, and (c) reduce the
- > jets' ability to form compact hot spots. The correlation between jet  
~~~~~
- > and compact hot-spot sidedness suggests that some portion of the jet flow  
~~~~~
- > maintains a mildly relativistic speed on large scales.  
~~~~~

This gets us into an area that we have not properly discussed around the group yet. What determines the compactness of the hot spots, and is Robert's suggestion unique? I'll bet that Colin will argue strongly with this! A suggestion for splitting what I think may be their main difference would be to drop Robert's sentence but add this paragraph.

"The correlation between hot spot compactness and jet sidedness does not fit this simple picture, however. It could imply that these jets contain a range of flow velocities at any distance from the quasar, and that part of the flow maintains a mildly relativistic speed even on the largest scales,"

If we do this, we might also raid the AJ draft again and insert the word "average" in front of "jet velocity" on line 4 of para.2

I think there's room (just) to do all of this, though I was aiming for a shorter abstract that people could scan easily in the program!

Cheers,

A.

From abridle Mon Oct 18 14:51:19 1993

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References: <9310181836.AA14695@physics.Trinity.EDU>

From: abridle (Alan Bridle)

To: dthough@physics.Trinity.EDU (David Hough)

Subject: Re: AAS Abstract

Date: Mon, 18 Oct 1993 14:51:15 -0400

Dave, it doesn't need to go in until later in the week,  
and I'm anyway waiting for NRAO accounting to come up with  
the real PO Number. As there's a small amount of controversy  
to settle down around Robert's additions, I'll wait until I've  
heard once more from everyone before sending it in. Take your  
time ....

A.

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Mailer: Elm [revision: 70.85]  
From: Colin Lonsdale <cjl@dopey.haystack.edu>  
To: abridle@polaris.cv.nrao.edu (Alan Bridle) (Alan Bridle)  
Subject: Re: Abstract  
Date: Mon, 18 Oct 93 14:59:13 EDT

Alan, your predictive powers amaze me! Yes, I do wish to argue with the insertion of language about hotspot beaming in this abstract. Such a thing is surely one of the less well agreed upon conclusions in this whole piece of work, and I think it has no place in a high-profile abstract. One could just as well talk about the way it fits in with the intrinsic asymmetry possibilities (which are discussed in the paper), and I think that would be inappropriate too. I vote for keeping the whole thing short and punchy, with the key results as in your original version (with Jack's modification of course). I see no need for insertion of ambiguous detail.

Sorry to be so combative, but that's what I think.

Cheers,  
Colin

From abridle Mon Oct 18 15:47:40 1993

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References: <9310181848.AA21038@polaris.cv.nrao.edu>

<9310181901.AA36795@polaris.cv.nrao.edu>

From: abridle (Alan Bridle)

To: Colin Lonsdale <cjl@dopey.haystack.edu>

Subject: Re: Abstract

Date: Mon, 18 Oct 1993 15:47:36 -0400

Hi Colin,

I've forwarded your message to all the others, so that everyone's seen everyone else's comments so far, and we'll see what the net reaction (literally) is ...

But for the moment, let me try to see if there's some middle ground between Robert's suggestion (which I'm not comfortable with as it stands either) and totally leaving the matter out of the abstract, which I gather is your preference.

I think Robert's right in asking us to point out that there are some correlations that don't quite fit the picture that the jets lose all memory of their relativistic speeds by the time they get to the hot spots. On the extreme "tired-jet" view, it is odd that the more compact hot spot correlates in any way with a sidedness that we all agree was dominated by Doppler favoritism on the smallest scales. As we're arguing that the "memory" of the relativistic flow gets weaker as the jet goes further out, Robert is correct to point out that the compactness correlation says that something at the hot spots still remembers about the apparent jet sidedness. My draft abstract, by talking only about the prominence-bending correlation, makes it sound simpler than it really is. It's not quite fair to call this an "ambiguous detail" -- it's more like a counter-observation to the one that the hot spot prominence seems to anti-correlate with the jet bending. It would be misleading to talk about either of them alone (while covering up the other).

We need to balance this against the fact that we'll all go in slightly different directions is about what the (hot spot compactness vs. jet sidedness) correlation means. One possibility is as Robert suggests, that there's a range of velocities whose average (weighted in some undefined way across the radius of the jet) indeed declines with distance, but a small and mildly relativistic "jet center" makes it all the way to the end. Maybe this is even hyper-relativistic right up to that last shock? This could be a way to get some sidedness differences in the very smallest hot spot structures, as seen. I find it hard to rule that out, though it's obviously not obligatory. One might complain that it's ad hoc, except for all the other reasons for considering "layered" jets. But would an intrinsic-asymmetry explanation not also have to be ad hoc about why the compact-hot-spot side always matches the Doppler-favored side when the two hot spots differ noticeably?

I don't think we'll find an explanation we're all happy with this week (and probably not for the AJ paper either), so we'll have to find something that we all can all live with that does not purport to be definitive. I think Robert may be a bit over-enthusiastic about the "hot spot beaming" picture now that we've got this evidence for "tired jets", but it would be remiss of us to pretend that the compactness correlation doesn't exist, too.

For the moment, I'd like to think about going back to the original abstract but adding a short paragraph that says that there is a spot compactness versus jet side correlation in this sample and that this implies that the simplest form of tired-jet description (all the flow transverse profile at the same velocity) may just be too simple to survive. Fortunately, that's an unphysical model anyway so there's no harm done by questioning it! But I'd stop far short of saying that this can only be explained by hot spot beaming. (Actually, Robert didn't say that, either, but you were anticipating that he would. <grin>).

Think it over this p.m. and let's see if we can get some mutually agreeable words together on Tuesday ....

A.

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Message-Id: <9310182026.AA18785@polaris.cv.nrao.edu>  
Received: by dopey.haystack.edu  
(1.37.109.4/16.2) id AA16884; Mon, 18 Oct 93 16:24:22 -0400  
In-Reply-To: <9310181947.AA36688@polaris.cv.nrao.edu>; from "Alan Bridle" at Oct 18, 93 3:47 pm  
Mailer: Elm [revision: 70.85]  
From: Colin Lonsdale <cjl@dopey.haystack.edu>  
To: abridle@polaris.cv.nrao.edu (Alan Bridle) (Alan Bridle)  
Subject: Re: Abstract  
Date: Mon, 18 Oct 93 16:24:22 EDT

Alan, I see your point about the hotspot sidedness being more than an "ambiguous detail". However, there is certainly nothing approaching a consensus among us about its interpretation (nor, I suspect, is there likely to be, perhaps even in the AJ paper). For that reason, I think it is not going to be possible to settle on a single "interpretation" in a short abstract that everybody will swallow. Covering enough bases to keep us all happy will take too much space.

Certainly, it's possible that a highly relativistic jet centre is responsible for post-shock beaming in the hotspots, just as it's possible that the core/jet correlation is due solely to an intrinsic relationship between cores and jets, and jets are slow. I don't think we should allude to such relatively unfounded speculations, even indirectly.

I don't think I buy your argument that our statements about tired jets need to be balanced by these hotspot sidedness arguments, which you regard as somewhat contradictory evidence. I would say that the \*interpretation\* of the hotspot data is the contradictory part, and as we have been discussing, that interpretation is far from unique. I'd be happy to just omit the whole issue, therefore, since I don't think balance is achieved by its inclusion.

What I would go along with is noting that this relationship exists, and is a strong and important correlation (previously noted, mind, not exactly a shattering revelation), but that it does not strongly favour any particular model at this stage. In other words, an abbreviated version of what the AJ paper will end up saying ... how can anybody object to that?

Cheers,  
Colin



From root Tue Oct 19 07:34:10 1993

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

["239" "Tue" "19" "October" "93" "12:34" "BST" "Robert Laing" "rl@mail.ast.cam.ac.uk " nil "6" "Abstract"  
"^From:" nil nil "10"])

Received: from cast0.ast.cam.ac.uk by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)

id AA30429; Tue, 19 Oct 1993 07:34:06 -0400

Received: by cast0.ast.cam.ac.uk (UK-Smail 3.1.25.1/2)

id <m0opFKJ-0001L5C@cast0.ast.cam.ac.uk>; Tue, 19 Oct 93 12:34 BST

Message-Id: <m0opFKJ-0001L5C@cast0.ast.cam.ac.uk>

From: rl@mail.ast.cam.ac.uk (Robert Laing)

To: abridle@polaris.cv.nrao.edu

Subject: Abstract

Date: Tue, 19 Oct 93 12:34 BST

Oh dear, I didn't realise I was challenging the prevailing orthodoxy!

However, I think that it is important to mention the correlation between  
compact hot-spot and jet sidedness, since this is an OBSERVATIONAL result.

Regards, Robert

From abridle Tue Oct 19 10:49:22 1993  
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["3800" "Tue" "19" "October" "1993" "10:47:24" "-0400" "Alan Bridle" "abridle " nil "86" "State of play re AAS  
abstract" "^From:" nil nil "10"])  
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)  
id AA38195; Tue, 19 Oct 1993 10:47:24 -0400  
Message-Id: <9310191447.AA38195@polaris.cv.nrao.edu>  
From: abridle (Alan Bridle)  
To: dhough@physics.Trinity.EDU, cjl@wells.haystack.edu, jburns@nmsu.edu,  
rl@rgosc.ast.cam.ac.uk  
Subject: State of play re AAS abstract  
Date: Tue, 19 Oct 1993 10:47:24 -0400

Hi all,

Here's my \$0.10 synopsis of the current issue (which I think will turn out to be useful in clearing up some murky stuff for the AJ paper).

I agree with Robert that the selection of topics in my draft abstract tilts the case a bit too far in favor of the simplistic "tired-jet" picture. Problem with picking things out for such a short abstract is that it's easy to pick the stuff that fits a particular viewpoint "to keep things simple". I share Robert's view that the correlation between hot spot compactness and the jetted side \_when there is an unambiguous compactness asymmetry\_ should be mentioned, as the effect is strong and runs counter to the simplest form of the "tired-jet" picture.

I agree with Colin that the \_interpretation\_ of this asymmetry is ambiguous, so I'm worried about giving only the relativistic-spot interpretation of it, as Robert's draft did. On its own, it could easily be explained by intrinsic asymmetries for example. But I do think we should mention the asymmetry as something that is clearly present in our sample, and which isn't going to fold up and go away easily either (based on the size of the sample in which Robert found the \_brightness\_ asymmetry, which must be almost the same thing if not quite).

As it stands, the "tired jet" picture argues that the hot spots are losing their "memory" of whatever produced the asymmetry at the bases of the jets, and we've nominated jet bending and deceleration as the linkage in this. The compactness asymmetry says "not that simple, there are hot spot characteristics that connect systematically to an asymmetry that first appeared on the parsec scales, no matter what you learned from the prominence-bending relationships".

I rather like the idea that we have a range of velocities at every distance, and this opens the possibility that some ultrarelativistic "jet center" survives to the end to remind us, even as far out as the hot spots, where the inner brightness asymmetries came from. I think there are other aspects of jetted sources, e.g. the bright compact jet terminations in 3C219, the very good hot spot alignments in some otherwise quite bent sources, like 3C390.3, that nudge in the same direction, as well as all the goodies about basal asymmetries in FRI sources that Robert has been dealing with, But we can't prove anything like that with just the data that we have in hand, so we shouldn't

push that picture here.

I suggest that for this abstract, we take my original version and add a paragraph at the end saying:

"We find a further correlation that may conflict with the {\it simplest} tired-jet interpretation, however. When there is a strong asymmetry in compactness between the jetted and counterjetted hot spots, it is always the jetted spot that is more compact. The hot spots thus retain some memory of the jet-sidedness asymmetry, but the mechanism for this is unclear."

We should briefly describe alternative mechanisms in the AJ paper (assuming we reach asymptotic agreement) and in a panel on the poster! The "stand-off" between our two apparently conflicting jet-hotspot correlations was emerging in Section 7.1 of the AJ paper draft, and I guess we're now at the point where we have to resolve it, or document the alternatives, more explicitly. I'm favor letting our two "extremists" (Robert - beaming at the hot spots based on a residue of ultrarelativistic flow in the jets - and Colin - intrinsic asymmetries gradually taking over with distance) draft their best shots at defending one view and rebutting the other, then see how much of both versions, with or without reconciliation, we can fit together in the paper.

The abstract has a shorter timescale, however, so we'd better just weasle it ...

Comments today if possible?

Thanks, A.

From root Tue Oct 19 11:28:09 1993  
X-VM-v5-Data: ([nil nil nil t t nil t nil nil]  
["1417" "Tue" "19" "October" "93" "10:23:59" "CDT" "David Hough" "dthough@physics.Trinity.EDU "  
"<9310191523.AA15704@physics.Trinity.EDU>" "24" "AAS Abstract" "^From:" nil nil "10"])  
Received: from vm1.tucc.trinity.edu by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)  
id AA24576; Tue, 19 Oct 1993 11:28:08 -0400  
Received: from physics.Trinity.EDU by VM1.TUCC.TRINITY.EDU (IBM VM SMTP V2R1)  
with TCP; Tue, 19 Oct 93 10:28:02 CDT  
Received: by physics.Trinity.EDU (4.1/SMI-4.1)  
id AA15704; Tue, 19 Oct 93 10:23:59 CDT  
Message-Id: <9310191523.AA15704@physics.Trinity.EDU>  
From: dthough@physics.Trinity.EDU (David Hough)  
To: abridle@polaris.cv.nrao.edu  
Subject: AAS Abstract  
Date: Tue, 19 Oct 93 10:23:59 CDT

Alan,

With your latest suggestion this morning of adding that one paragraph about the jet side-compact hot spot correlation, I believe the Laing-Lonsdale battle has been well-adjudicated on your part for the time being. And as you say, the opposing attorneys can submit their briefs for review by a three-judge panel, with you presiding, to determine what finally goes in the AJ paper.

So for the abstract, I would only say:

- (1) Of course make Jack's change in Par.2, Line 2 (strike "jets");
- (2) The comma following "bent" in Par.1, Line 5 might also go, although

I could possibly see the grammatical argument for keeping it there;  
and

- (3) I don't think it's fair to say "Counterjet candidates are found preferentially in the outer parts of the sources". It is clearly not true for 3C9, 3C249.1, and 3C351, so that's 3 of 7 right there. It is obviously true only for 3C334 and 3C336; 3C68.1 and 3C215 are more "halfway" cases to me. What is true, of course, is that "There are no counterjet candidates opposite long, uninterrupted straight segments of the main jets" (stolen from AJ paper again). I would prefer this instead, as it is clearly an accurate statement of when counterjets do NOT appear.

That's it; you can ship it off if you've no complaints with these minor changes. Thanks for beating it into shape!

-Dave

From abridle Tue Oct 19 14:53:12 1993  
X-VM-v5-Data: ([nil nil nil t nil nil nil nil nil]  
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"^From:" nil nil "10"])  
Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)  
id AA41231; Tue, 19 Oct 1993 14:52:26 -0400  
Message-Id: <9310191852.AA41231@polaris.cv.nrao.edu>  
References: <9310191523.AA15704@physics.Trinity.EDU>  
From: abridle (Alan Bridle)  
To: dthough@physics.Trinity.EDU (David Hough)  
Subject: Re: AAS Abstract  
Date: Tue, 19 Oct 1993 14:52:26 -0400

Just to note that I'm basically happy with Dave's suggestion. I was mentally factoring in the fact that the counterjets in 3C9 and 351 are just isolated weak knots when I said that the candidates are preferentially in the outer parts. But I agree that this could be misleading and the original statement from the paper about where there are \_no\_ candidates serves our purpose just as well here.

So unless I hear from someone later today with strong feelings to the contrary, I'll send the abstract in tomorrow with my additional paragraph and Dave's changes made.

Then we'll await Robert vs Colin re the battle of the hot spot correlations! N.B. Let's aim to thrash that (and any other controversies) out thoroughly by the end of my road trip:

Nov 7-10 with Dave in San Antonio  
Nov 12-13 with Jack in Las Cruces  
Nov 14-?? with Robert in Socorro

(Colin, Robert -- that's a hint about a good deadline, can you get something done before I get to San Antonio?)

Cheers, A.

From root Tue Oct 19 16:10:09 1993

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

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id AA37144; Tue, 19 Oct 1993 16:10:05 -0400

Received: from physics.Trinity.EDU by VM1.TUCC.TRINITY.EDU (IBM VM SMTP V2R1)

with TCP; Tue, 19 Oct 93 15:09:59 CDT

Received: by physics.Trinity.EDU (4.1/SMI-4.1)

id AA15984; Tue, 19 Oct 93 15:06:01 CDT

Message-Id: <9310192006.AA15984@physics.Trinity.EDU>

From: dthough@physics.Trinity.EDU (David Hough)

To: abridle@polaris.cv.nrao.edu

Subject: AAS Abstract

Date: Tue, 19 Oct 93 15:06:01 CDT

A.,

Looks fine and dandy; might just delete what appears to be an  
extraneous "also" in line 6 (the "Jet bending..." sentence).

-D.

From abridle Tue Oct 19 16:29:40 1993

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

["367" "Tue" "19" "October" "1993" "16:29:36" "-0400" "Alan Bridle" "abridle " nil "10" "Re: AAS Abstract"  
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Received: by polaris.cv.nrao.edu (AIX 3.2/UCB 5.64/4.03)

id AA03972; Tue, 19 Oct 1993 16:29:36 -0400

Message-Id: <9310192029.AA03972@polaris.cv.nrao.edu>

References: <9310192006.AA15984@physics.Trinity.EDU>

From: abridle (Alan Bridle)

To: dthough@physics.Trinity.EDU (David Hough)

Subject: Re: AAS Abstract

Date: Tue, 19 Oct 1993 16:29:36 -0400

Hmm - I'm not sure that is extraneous. The previous line says that jet bending destroys one relationship. The "also" sentence says that it favors two others. Maybe this linkage is too obscure, but the also was meant to draw attention to it. It is doesn't work for you, it probably won't work for most other people, though, and we should put it differently?

A.

From root Tue Oct 19 17:05:35 1993

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

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with TCP; Tue, 19 Oct 93 16:05:25 CDT

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id AA16056; Tue, 19 Oct 93 16:01:26 CDT

Message-Id: <9310192101.AA16056@physics.Trinity.EDU>

From: dthough@physics.Trinity.EDU (David Hough)

To: abridle@polaris.cv.nrao.edu

Subject: AAS Abstract

Date: Tue, 19 Oct 93 16:01:26 CDT

A.,

O.K., I see your point, but to me the "also" made it sound like we had just said something else about what jet bending "favors" when we hadn't. If you think it's O.K. as is, I won't complain. Or perhaps try something like "While the outer, bent jet segments do not share this correlation, jet bending does favor the detection of counterjet candidates and inhibit the formation of prominent hot spots." But I'm not being picky; my tolerance of relatively minor problems seems to increase dramatically during semesters, since it's hard to find time to even pay attention to the major ones!

-D.



From root Wed Oct 20 09:50:29 1993

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

["1543" "Wed" "20" "October" "93" "9:50:16" "EDT" "Colin Lonsdale" "cjl@dopey.haystack.edu" nil "24" "Re: State of play re AAS abstract" "^From:" nil nil "10"])

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

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Message-Id: <9310201350.AA16185@polaris.cv.nrao.edu>

Received: by dopey.haystack.edu

(1.37.109.4/16.2) id AA24596; Wed, 20 Oct 93 09:50:16 -0400

In-Reply-To: <9310191447.AA38195@polaris.cv.nrao.edu>; from "Alan Bridle" at Oct 19, 93 10:47 am

Mailer: Elm [revision: 70.85]

From: Colin Lonsdale <cjl@dopey.haystack.edu>

To: abridle@polaris.cv.nrao.edu

Subject: Re: State of play re AAS abstract

Date: Wed, 20 Oct 93 9:50:16 EDT

Alan, I think your added paragraph is fine. As the elected representative of the intrinsic asymmetry extremist movement, I applaud the excision of the politically incorrect hotspot beaming language from the abstract, and look forward to the upcoming debate with Cardinal Laing (Antonucci 1993).

By the way, just to keep you informed, I have naturally jumped back into my high-z source database and done a rough job of dissecting out the straight jets, to have an independent crack at the core/jet prominence relationship. Preliminary results show a clear correlation, though one outlier reduces the formal significance to about the 1 percent level. The significance is at the 20 percent level when unjetted lobes are included in the normalization!! The slope for the jetted lobe normalization case is around 0.85. Difficulties include a predominance of very bent jets for which it is difficult to define a straight segment (do you include the 1st knot or knot, so to speak). The cores generally have steep spectra. This may tilt the correlation in two different directions. First, the limiting slope for equal gammas is closer to 1 not 1.2, and second, the "core" flux being steep spectrum may be more dominated by larger-scale (decelerated?) emission, which will steepen the correlation slope. Estimating  $\gamma_j$  is therefore much more tricky. We may prepare something for the AAS on this work if we can beat it into shape in time. It would be nice to use my database to be the first to "follow up" on the AJ paper result.

Colin

From abridle Wed Oct 20 11:26:41 1993

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id AA17295; Wed, 20 Oct 1993 11:26:19 -0400

Message-Id: <9310201526.AA17295@polaris.cv.nrao.edu>

From: abridle (Alan Bridle)

To: jburns@nmsu.edu, rl@rgosc.ast.cam.ac.uk

Subject: "Last call" on AAS abstract

Date: Wed, 20 Oct 1993 11:26:19 -0400

Jack, Robert:

Here's the version that goes to AAS this afternoon unless one of you wants a further change. Dave and Colin are happy with this version, this is just to check in with you both as I didn't hear from you (about this) yesterday.

A.

---

\begin{document}

\category{18}

\title{"Tired" Jets in Extended 3CR Quasars}

\author{A.H.Bridle}

\affil{NRAO}

\author{D.H.Hough}

\affil{Trinity University}

\author{C.J.Lonsdale}

\affil{Haystack Obs.}

\author{J.O.Burns}

\affil{NMSU}

\author{R.A.Laing}

\affil{RGO}

\begin{abstract}

We have imaged 13 extended 3CR quasars with high sensitivity and resolution using the VLA at 4.9 GHz.

We find a strong correlation between the prominence (relative to the extended lobe emission) of the milli-arc-second scale central features and of the inner, straight segments of the radio jets. The outer, bent, jet segments do not share this correlation, however.

Jet bending favors the detection of counterjet candidates, and inhibits the formation of prominent hot spots. There are no counterjet candidates opposite long, uninterrupted straight segments of the jets, and there is no evidence that the prominence of counterjet candidates anti-correlates with that of the jets, as it would if relativistic beaming controls the jet/counterjet asymmetry far from the quasar.

These data favor "tired jet" models in which the flows through the parsec-scale radio features are highly relativistic but those in larger-scale jets are only mildly relativistic. Further decreases in

average jet velocity on kiloparsec scales may then (a) allow the jets to bend, (b) allow counterjets to become more visible, and (c) reduce the jets' ability to form compact hot spots.

We find a further correlation that may conflict with the *simplest* tired-jet interpretation, however. When there is a strong asymmetry in compactness between the jetted and counterjetted hot spots, it is always the jetted spot that is more compact. The hot spots thus retain some memory of the jet-sidedness asymmetry, but the mechanism for this is not clear.

`\end{abstract}`

`% Don't remove or comment out.`

`\admininfo`

`\end{document}`

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From root Wed Oct 20 11:37:40 1993

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"Re: \"Last call\" on AAS abstract" "^From:" nil nil "10"])

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Received: from charon (charon.NMSU.Edu) by NMSU.Edu (4.1/NMSU-1.18)

id AA29886; Wed, 20 Oct 93 09:37:34 MDT

Message-Id: <9310201537.AA29886@NMSU.Edu>

Received: by charon (4.1/NMSU)

id AA03982; Wed, 20 Oct 93 09:37:34 MDT

From: jburns@NMSU.Edu

To: abridle@polaris.cv.nrao.edu

Subject: Re: "Last call" on AAS abstract

Date: Wed, 20 Oct 93 09:37:34 MDT

Alan:

I'm satisfied with the abstract. Nice job in fact. I've been following this "religious debate" with amusement from afar.

Cheers,

Jack

From root Wed Oct 20 11:45:36 1993

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

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id AA32900; Wed, 20 Oct 1993 11:45:15 -0400

Received: by cast0.ast.cam.ac.uk (UK-Smail 3.1.25.1/2)

id <m0opfio-0001LBC@cast0.ast.cam.ac.uk>; Wed, 20 Oct 93 16:45 BST

Message-Id: <m0opfio-0001LBC@cast0.ast.cam.ac.uk>

From: rl@mail.ast.cam.ac.uk (Robert Laing)

To: abridle@polaris.cv.nrao.edu

Subject: Abstract

Date: Wed, 20 Oct 93 16:45 BST

Fine. See you on 13th. Robert

From pjackson Mon Oct 18 16:13:17 1993  
X-VM-v5-Data: ([nil nil nil t nil nil nil nil nil]  
["257" "Mon" "18" "October" "1993" "16:12:49" "-0400" "Phyllis Jackson" "pjackson" nil "13" "Purchase Order  
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id AA37536; Mon, 18 Oct 1993 16:12:49 -0400  
Message-Id: <9310182012.AA37536@polaris.cv.nrao.edu>  
From: pjackson (Phyllis Jackson)  
To: staff.dis  
Subject: Purchase Order Number for AAS Abstracts  
Date: Mon, 18 Oct 1993 16:12:49 -0400

A blanket purchase order (P.O) has been set up with the AAS to which  
you may charge the fee for electronically submitted abstracts  
for the January meeting.

The P.O. number you may use is:

40101-7031.

Only abstracts are to be charged, please.

From abridle Wed Oct 20 12:46:58 1993  
X-VM-v5-Data: ([nil nil nil t nil nil nil nil nil]  
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"^From:" nil nil "10"])  
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id AA15361; Wed, 20 Oct 1993 12:46:53 -0400  
Message-Id: <9310201646.AA15361@polaris.cv.nrao.edu>  
From: abridle (Alan Bridle)  
To: abs-submit@blackhole.aas.org  
Subject: Abstract for 183d Mtg  
Date: Wed, 20 Oct 1993 12:46:53 -0400

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

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

%

% American Astronomical Society electronic abstract form.

% Meeting #183, January 11-14, 1994

%

% Abstract DEADLINE: October 23, 1993

\documentstyle[11pt,aasab]{article}

\nofiles

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

%\runningident{}

%\session{}{}

% In many of the commands that follow, sample information has been

% entered between the curly braces {}. You should delete this text

% and replace it with your own correct information. Please refer

% to the instructions if you have any questions.

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%\society{sig}{WGAIT} % OPTIONAL

%\society{sig}{WGAS} % OPTIONAL

\firstauthor{M.R.Swain} % REQUIRED

%\sponsor{} % OPTIONAL

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

\authorphone{804-296-0294} % REQUIRED

\authoremail{mswain@nrao.edu} % OPTIONAL

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\expirationdate{}

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\begin{document}

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

```
\begin{abstract}
```

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

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

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

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

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

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\firstauthor{A.H.Bridle} % REQUIRED

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\authoremail{abridle@nrao.edu} % OPTIONAL

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\author{A.H.Bridle}
\affil{NRAO}
\author{D.H.Hough}
\affil{Trinity University}
\author{C.J.Lonsdale}
\affil{Haystack Obs.}
\author{J.O.Burns}
\affil{NMSU}
\author{R.A.Laing}
\affil{RGO}
\begin{abstract}
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We have imaged 13 extended 3CR quasars with high sensitivity and resolution using the VLA at 4.9 GHz.

We find a strong correlation between the prominence (relative to the extended lobe emission) of the milli-arc-second scale central features and of the inner, straight segments of the radio jets. The outer, bent, jet segments do not share this correlation, however.

Jet bending favors the detection of counterjet candidates, and inhibits the formation of prominent hot spots. There are no counterjet candidates opposite long, uninterrupted straight segments of the jets, and there is no evidence that the prominence of counterjet candidates anti-correlates with that of the jets, as it would if relativistic beaming controls the jet/counterjet asymmetry far from the quasar.

These data favor "tired jet" models in which the flows through the parsec-scale radio features are highly relativistic but those in larger-scale jets are only mildly relativistic. Further decreases in average jet velocity on kiloparsec scales may then (a) allow the jets to bend, (b) allow counterjets to become more visible, and (c) reduce the jets' ability to form compact hot spots.

We find a further correlation that may conflict with the *simplest* tired-jet interpretation, however. When there is a strong asymmetry in compactness between the jetted and counterjetted hot spots, it is always the jetted spot that is more compact. The hot spots thus retain some memory of the jet-sidedness asymmetry, but the mechanism for this is not clear.

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