

From root Mon Oct 5 16:43:24 1992

From: dclarke@chandra.harvard.edu (David Clarke)

To: abridle@polaris.cv.nrao.edu, rperley@aoc.nrao.edu

Cc: dclarke@chandra.harvard.edu

Subject: Re: Bow shocks

Date: Mon, 5 Oct 92 16:41:13 EDT

OK, here it comes. I am beginning to come around to dismiss the so-called compression model too. Despite everyone's valient attempts, I just hadn't appreciated the "power" of Doppler favouritism. At any rate, Alan brought up again - this time I heard it - the notion that there really is something still (apparently) feeding the southern hotspot. I look back in the 1991 paper that Jack and I put out which discusses the restarting jet scenario, and it seems to me we may be seeing part of that in 219. In this model, the old jet is *still* feeding the hotspot - we just gotta look! It's right there in that "extension" from S9 to the core that both CBBPN and BPH pointed out. When the old jet got cut off, as it were, a rarefaction wave travelled down the pipe at the jet speed plus the sound speed, which for highly supersonic velocities, is just v_{jet} . That takes a non-zero time to happen, during which time the hotspot is unaware that the jet has been turned off and thus remains bright and compact. Could this extension back to the core be that vestigial jet? And the edge-brightened features could be the rim of the now hollow cavity which once housed the jet. In time, this cavity will collapse onto itself, but in the meantime, it is filled with cold (the rarefaction wave acts like a rapid decompression, sapping the stuff of its energy), non-emitting stuff which should yield a centre-darkened region which once was the jet. Before the vistigial jet has completely emptied into the southern hotspot, the new jet is launched. As in Jack and my paper, this jet is launched into a rarefied, hot medium, with a high sound speed. The new jet may even be ballistic (denser than its immediate surroundings). Remember, its ambient is the old jet stuff - hotter and more rarefied for having passed thru the working surface. The new ballistic jet is not slowed (much) by the ambient, rendering a weak jet shock and a very bright (Doppler boosted) jet. Observationally, a weak jet shock may be supported by the fact that the tip of the jet isn't all *that* much brighter than the rest of the jet - at least not orders of magnitude (or is it? I forget what the new data say). Presumably the Mach disc is strong enough that on the CJ side, the tip slows enough to become visible.

Allow me the occasional "yes but..." if I feel the compression model deserves another gasp of breath here and there, but at this point, I see the above scenario as being quite inviting.

To answer Alan's other question directly, yes, I see X-shocks as a ubiquitous feature to be in trouble. I should point out, though, the same simulations show that terminal Mach discs are often not seen either. Instead, 3D jets seem to end in a series of oblique shocks. This may be telling us that we are not in the correct Mach number regime, and the Mach number which restores the integrity of Mach discs (if that is desirable) may also restore X-shocks. The jury is still out on that one.

You guys got a good sense of humour? Hope so, cause if my "revelations" are right, I could have been leading us all on a wild goose chase!

Cheers, David.

Re: Bow shocks

From root Wed Jul 15 17:34:02 1992

From: rperley@sechelt.AOC.NRAO.EDU (Rick Perley)

To: dclarke@ncsa.uiuc.edu

Cc: abridle@sechelt.aoc.nrao.edu, ccarilli@sechelt.aoc.nrao.edu

Subject: Re: Some More Ideas...

Date: Wed, 15 Jul 92 15:39:32 MDT

About Cyg A, I meant that if the thermal matter in the lobes was at the same density as the ambient, or anywhere close to it, the depolarization would be complete. (Remember, the ambient density around Cyg A is higher than 10^{-2} /cc.) The best estimates of the upper limit is about 10^{-4} or 10^{-5} . If it were that high, the thermal gas would easily dominate the dynamics. But of course it could be MUCH lower, so far as the observations tell us. Perhaps there are good theoretical reasons it can't be, but if so, I don't know them.

Yup, the bright tips on both jets is a challenge to the BA++ model. (Excuse the bad pun). It's tough to arrange the jets to be relativistically boosted, and have the hot tips leading the way but NOT be boosted.

Gotta Pack!

Rick

Re: Some More Ideas...