UNIFICATION ISSUES (*DISCUSSION*)

Discussion of the paper presented by GOPAL-KRISHNA (p. 373)

Lacy: Why do you think that the lower QSR fraction in fainter flux radio samples is a luminosity, rather than redshift, effect?

Gopal-Krishna: Narrower torus openings in less luminous sources are expected from theory and also inferred for radio–quiet AGN.

Miley: We have long known that variability and environment play a role in the observed properties of radio sources. You can't explain either the variability of QSRs, or the fact that radio sources don't occur in spirals by orientation alone. As you mentioned, the main attraction of the orientation unification was its simplicity and predictive ability. Now that life is clearly more complicated, wouldn't it be reasonable to start afresh, and re-examine possible scenarios where orientation is not the dominant effect?

Gopal-Krishna: I agree that temporal evolution must be incorporated into any realistic modelling of radio source populations, including their unification. Doing that, I have suggested that the radio size measurements can be reconciled with the basic tenet of the orientation unification, viz., that radio galaxies are oriented closer to the sky plane than quasars.

Laing: I would like to object to George Miley's attack on unification. It is, of course, not necessary for orientation to explain everything. But, unless quasars have side-on counterparts, much of what we believe about radio-source physics must be incorrect, and we have very good evidence at least for the basic relativistic-jet picture.

Urry: While there may be a 'reasonable doubt' about some aspects of unification of radio galaxies and quasars, it is supported by a 'preponderance' of the evidence. A question: Why do you consider the characteristics of BLRGs a problem, why can't they be low-luminosity (local) quasars?

Gopal-Krishna: Apparently, BLRGs differ from *both* radio galaxies and quasars in having distinctly flatter mid–IR spectra.

R. Ekers et al. (eds.), Extragalactic Radio Sources, 409–412.

Discussion of the paper presented by <u>*NORRIS*</u> (p. 381)

di Serego Alighieri: Have you considered that, since you are working at the low end of the radio luminosity function and your objects are not selected in the radio, your core detections will be largely influenced by small random variations of the intrinsic radio luminosity and therefore cannot be used to test anything?

Norris: It is easy to test statistically whether this result could be produced by random variations. The probability of obtaining this result by chance is less than 1%.

Wilson: To compare the radio properties of Seyfert 1 and 2 cores, one needs to compare the distributions of radio luminosities of the cores, not just the detection rate. When one does that, what is the statistical significance of any difference between the radio core luminosity distributions of Seyfert 1's and 2's.

Norris: The reason for using detection rates, rather than core luminosities, is that it's very difficult to do rigorous statistics on the core luminosities when most are non-detections, as the luminosity distribution is then dominated by upper limits.

de Bruyn: The higher detection rate for Sey 2's reminds me of our own results (de Bruyn and Wilson, 1978, A&A). That (UV-selected) Markarian-Seyfert sample was biased. Your sample could be biased as well (e.g. distance, luminosity?) Have you investigated these effects? What we need is a volume-limited sample constructed from samples selected through various ways (X-ray, UV, IR, radio, optical). Can you now construct such a sample?

Norris: Yes, we are well aware of such potential problems, and we used a FIR-selected sample for that reason, since FIR should be unaffected by orientation. However, we also have optically-selected samples, and 12μm-selected samples, and the results on these are consistent with the FIR- selected sample. It would be nice to have a hard X-ray sample too (soft X-rays are still affected by orientation), but I don't know of any hard X-ray selected sample of sufficient size.

Meier: I am not as worried that there are too few cores in Sy 1's as I am that there are too many cores in Sy 2's. There are two possibilities:
1. these cores are like other flat spectrum cores (in radio quasars, for example). If so, then the fact that they can be seen from the side (in Sy 2's) suggests that cores are not relativistically beamed after all. This

https://doi.org/10.1017/S0074180900081274 Published online by Cambridge University Press

would have important implications for other unified schemes.
or 2. these "cores" are not cores in the true sense, but rather small steep spectrum jets which can be seen from the side. Do you have any spectral information on these cores which would distinguish between these two cases.

Norris: There seems to be little evidence for relativistic beaming in Seyfert cores, and so in this respect they differ from their high-energy cousins. Spectral index is difficult to disentangle from resolution effects, but as far as we can tell the data are consistent with a spectral index of -0.7.

Koekemoer: If you plot the subtracted radio (core) flux vs. the FIR flux, do you still see a weak correlation? If not, can you use this to constrain the amount of FIR emission due to the torus vs. the FIR from the extended galaxy?

Norris: Perhaps surprisingly, we see no significant correlation between the core flux and the FIR flux. I don't know whether this places a significant constraint on the re- processed FIR flux from the torus, but it's an interesting question.

Discussion of the paper presented by di SEREGO ALIGHIERI: (p. 389)

Gelderman: To complete the test of possible anisotropic [OIII] emission, have you observed a sample of quasars, to compare to your quoted radio galaxy results?

di Serego Alighieri: Yes, in addition to the six radio galaxies, we have also observed three quasars, for which [OIII] and [OII] are not detected in the polarised flux. We interpret this as due to the fact that in quasars any anisotropic line flux is pointed towards us and therefore we do not see the scattered component.

Discussion of the paper presented by ATHREYA (p. 393)

Miley: How do you define and isolate the radio cores? Isn't it possible that interaction with the ionized gas could be responsible for the steep spectrum?

Athreya: The earlier steep spectrum cores which turned out to be ionized haloes round the flat spectrum cores were all structures which could be resolved at scales of 2-5 kpc. The cores discussed in this paper are unresolved with a resolution of 0.2″ and likely to be even smaller (at z$\sim$2.5, 0.1$''$ $\sim$0.7 kpc). We believe that these are more likely to be the parsec scale cores of radio sources. However, higher resolution studies will be able to confirm this.

Laing: Your conclusions about the doppler-shifting of the core break frequency depend on the assumption of a single velocity: if a range of velocity is present, the slower emission will dominate for side-on sources and faster emission for end-on sources.

Athreya: That is correct. However, the dependence on the doppler factor is very weak for the size and the magnetic field calculation (not so for the electron number density). The values presented in the text are only order of magnitude estimates.

Ekers: (commenting on a question by Andrew Wilson). I strongly support Andrew's view that it will be hard to see the small effect of orientation on projected linear size when the distribution of linear sizes is so large. There must be other physical effects which we don't understand which are producing changes 100 times larger than that predicted by orientation.