From abridle Fri Aug 21 12:10:18 1992
From: abridle (Alan Bridle)
To: pjackson (Phyllis Jackson)
Subject: Re: Reminder – Science Content of NSF Program Plan
Date: Fri, 21 Aug 92 12:10:17 –0400

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Note - Joan Wrobel may already have provided text re the VLBA observations of M84. If so, use her text in place of the first paragraph below.
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The apparently one-sided base of the brighter jet in the nearby low-power radio galaxy M84 will be studied with the VLBA to determine whether it contains fine structure that makes it a suitable candidate for proper motion studies. This is a first step in determining whether M84 can be used to explore the hypothesis that the "twin" jets in weak radio galaxies initially have bulk relativistic velocities, but decelerate to subrelativistic velocities on the larger scales accessible with VLA observations. This hypothesis is a basic, but untested, precept of "unified" models that identify BL Lac objects and weak twin-plumed radio galaxies as members of the same population of weak radio emitters observed in systematically different orientations.

The prominence (relative to the extended lobes) of radio jets and counterjets in two complete samples of powerful radio galaxies and quasars have now been determined. The results will be correlated with the detailed lobe morphologies to test predictions of "unified" models that identify radio-loud galaxies and quasars as members of the same population of strong radio emitters observed in systematically different orientations.

A multi-wavelength, high-resolution VLA study of the filamentary lobes of the radio galaxy 3C353 will be continued. No satisfactory model exists for the origin of such large-scale filaments, yet their existence and prominence in sources such as 3C353 calls into question the conventional assumptions about equipartition of energy, and about the isotropy of magnetic fields and particle motions, in radio lobes. 3C353 is nearby and well-resolved example of a filament system that is particularly amenable to detailed study. The highest angular resolution possible will be used to quantify the spatial structure and power spectrum of its filamentation, and to clarify the relationship between apparently bright and apparently dark filamentary features. Multi-wavelength observations will also be used to determine whether the continuum radio spectra of the filaments differ systematically from each other or from those of the more diffuse lobe emission, and to map the magnetic structures in the filaments. The results will be compared with those of numerical models that presently suggest several different mechanisms that could lead to large-scale filamentation.

The internal structures of the jets and counterjets in the radio galaxies 3C219 and 3C353 will also be examined at high resolution using the VLA, for comparison with differing models of emissivity variations and symmetries in powerful sources.

Work will continue on the "3CR Radio Atlas" -- a compilation of VLA, MERLIN and WSRT imaging of a complete sample of nearby 3CR radio sources into a digital database. This joint project with investigators at the NRAL and NFRA will provide extragalactic

researchers with well-observed, calibrated images of a representative sample of the brightest extragalactic sources.