

Poster Contributions: Radio Emission (Maps)

OPTICALLY QUIET QUASARS – RADIO AND OPTICAL INVESTIGATIONS

CHIDI E. AKUJOR¹, R.W. PORCAS, A.R. PATNAIK² and A. ARDEBERG³

¹ *Onsala/Jodrell Bank*

² *MPIFR Bonn*

³ *Lund Observatory*

The activity in the nuclei of bright galaxies could arise from a number of sources: they may contain compact variable radio sources, they may be strong IR/optical/X-ray continuum sources, or they may have strong emission lines. Usually but not always these properties go together as in radio loud quasars. However, there appears to exist a class of objects which resemble quasars in radio structure and brightness – have strong flat spectrum cores but appear fainter than would be suggested by their radio brightness – unidentified on sky surveys (Zensus & Porcas, 1985, in J. Dyson, ed, AGN). These are called 'optically quiet quasars' (OQQs).

In a recent large sample of bright flat spectrum sources (Patnaik et al. 1992, MN, 254, 655), we found that a significant fraction (20%) are OQQs (that is, unidentified optically). We are currently investigating a sample of 153 OQQs using the VLA, VLBI to find their arcsec and milliarcsec radio structures and optical imaging with the NOT to search for faint optical counterparts. This will enable us to classify and determine the nature of OQQs and their relationship with other types of powerful radio sources.

The VLA observations at 8.4 GHz show that the core fractional polarisation of OQQs (mean 1.8%) is lower than those of 'normal' quasars (mean 2.4 %). Observations with VLBI at 5 GHz and VLBA at 8 GHz of a core sample of 30 strongest OQQs are being undertaken. We find a mixed bag of radio structures: unresolved sources, core-jets, doubles, triples. Such milliarcsec radio structures are similar to those found in 'normal' quasars (see Akujor & Porcas, in J. Roland et al. eds, EGRSs...Beams to Jets, p 134). NOT images of 75% of the objects have been made. About half of the objects are identified with red stellar objects, the difference between the m_R and $m_V \sim 1\text{mag}$ suggests that some of them are at very high redshifts. Also, a number of OQQs have been detected in IR measurements (Beicham et al. 1981, ApJ, 247, 780)

These preliminary results suggest the possible scenarios are: (i) OQQs may be a distinct class with very steep optical-IR spectra, (ii) may be high redshift quasars and hence faint, (iii) nuclei of variable flat-spectrum radio galaxies i.e. potential BL Lac objects, e.g. 2309+45 which although very bright $m \sim 18$ is not visible on POSS. (iv) active nuclei obscured by dust, so they owe their color to dust absorption, and (v) gravitationally lensed – the reddening arising from absorption in dust associated with the lensing galaxy (e.g. 0218+357 has been shown to be a lensed system, Patnaik et al. 1992 MNRAS, 261,435).