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PKS 1718–649, the Nearest GPS Radio Source

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Abstract. PKS 1718−649 has a classic GPS spectrum and is identified with the galaxy NGC 6328. At a distance of 56 Mpc, PKS 1718−649 becomes the nearest known GPS radio source.

PKS 1718−649 has been identified with the 12.6 magnitude spiral galaxy NGC 6328 (Savage 1976) at a distance of 56 Mpc (for $H_0 = 75\ km\ s^{-1}\ Mpc^{-1}$ and a red shift = 0.0145 (Savage, Bolton, & Wright 1976). The active nucleus at the center of the galaxy is classified as a LINER (Fosbury et al. 1977). The optical galaxy is clearly unusual in appearance on the UK Schmidt SERC J survey plate in that it is an elliptical galaxy with a central brightness $r^{\frac{1}{4}}$ de Vaucouleurs profile, but has fainter spiral arms that extend out approximately 20 kpc from the nucleus (Veron-Cetty et al. 1995).

Figure 1 (LHS) shows the radio spectrum which meets the requirements to classify it as a GPS source with a spectral peak near 3 GHz. As such it is the nearest known GPS source. Australia Telescope Compact Array (ATCA) observations were made in 1993 at 2.4 GHz and show the source to be completely unresolved on the longest ATCA baseline (6 km). Moreover, they also reveal no extended structure at a dynamic range of 1000:1 and show a low fractional polarization of 0.35% at a position angle of −6°.

VLBI observations were made with the Southern Hemisphere network (Preston et al. 1989) in 1993–94 at 2.3, 4.8, and 8.4 GHz (see Tingay [1996] for details of the telescopes used and the dates of observation). The 4.8 GHz image is presented in Figure 1 (RHS) where the source appears double with a separation of 7 mas, or 1.8 pc. The VLBI and total flux densities are the same at all three

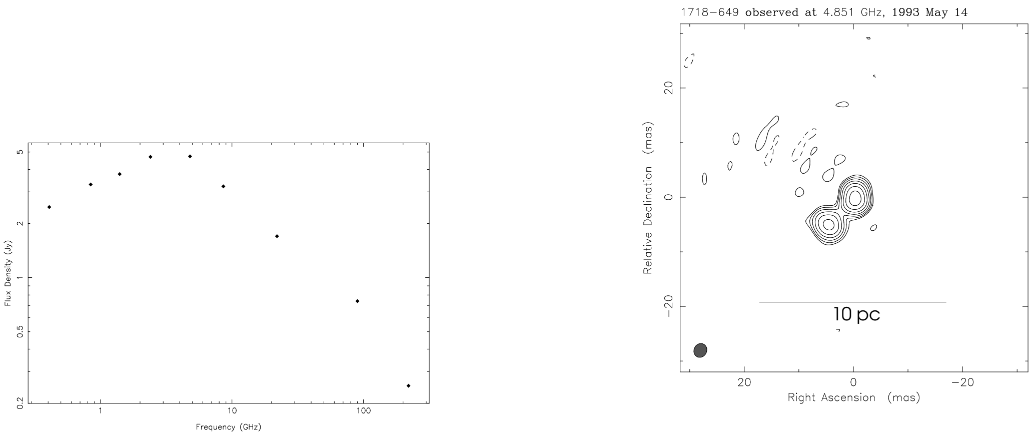

Figure 1. LHS: The total power spectrum of PKS 1718–649 between .408 and 230 GHz. The 2.3, 4.8, and 8.4 GHz points with 10% error bars are measurements from VLBI images. RHS: VLBI image of PKS 1718−649 at 4.8 GHz. The peak flux density is 2.0 $Jy.beam^{-1}$ and the contours are at -1, 1, 2, 4, 8, 16, 32, 64% (Beam FWHM 2.6x2.3 mas, $PA = -29.5°$).

frequencies, indicating that there is no significant structure missing from the VLBI images.

The north-west component is the brighter and more compact of the two components. The north-west component has a steep-spectrum between 4.8 and 8.4 GHz, while the south-east has a flat spectrum. The components appear very similar in structure at 4.8 GHz, and neither resembles the pc-scale core-jets seen in many other compact radio sources. At 4.8 GHz both components appear marginally extended, with brightness temperatures of $5\text{x}10^{10}$ and $2\text{x}10^{10}$ K for the NW and SE components respectively. There is therefore no evidence for beaming in either of the components.

References

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