

The impact of the orientation on the lobe asymmetry in 3C328 radio galaxy

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The lobes of the so-called Fanaroff-Riley (FR) type II radio galaxies are terminated with hotspots. In radio galaxy 3C328, however, only one lobe is FR II-like with a hotspot, whereas the other lobe has no hotspot (Fig.1). We carried out the VLBA observations of the centre of 3C328 and we found there a jet oriented towards the lobe that is devoid of a hotspot (Fig.2).

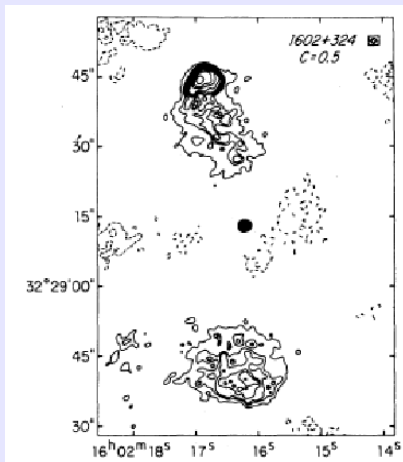


Fig. 1 VLA image of 3C328 at 1465 MHz (Machalski & Condon 1983, *AJ*, 88, 143)

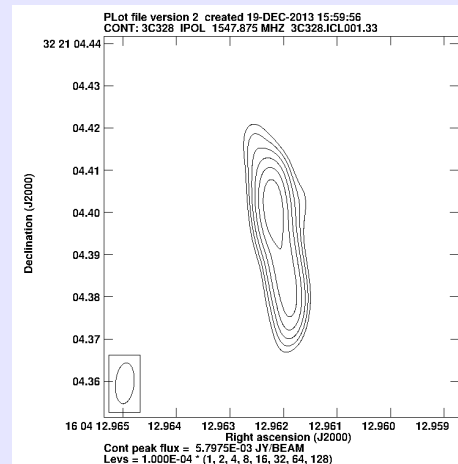


Fig. 2 Our VLBA image of the core of 3C328

At first sight, it is puzzling why despite the presence of the jet seemingly fuelling the southern lobe it appears as a relic. We propose the following interpretation of this apparent paradox. 3C328 is a typical FR II radio galaxy but its nucleus remained quiescent for some time in the recent past. Since no jets were produced then, the hotspots were not energised and so they *both* have faded out. What we assume is that the northern lobe is significantly farther than the southern one, hence the hotspot of the former is perceived as not dispersed yet owing to the light-travel lag. The jet was restarted after a period of quiescence, it has thus no causal connection with the southern lobe it points at. Given that one-sided jets are always beamed towards the observer, the southern lobe must be on the near side, which is what we assume, therefore its hotspot is not visible, which is what we observe.

The above reasoning is similar to that used when explaining Laing-Garrington effect, i.e. the correlation between the jet orientation and the degree of polarisation of radio lobes. What we present here is an analogue of Laing-Garrington effect but, instead of an asymmetry of polarisation that perhaps could also be present in 3C328, we observe an asymmetry of appearance of its lobes – the near-side lobe “looks older” than the far-side lobe. Such kind of asymmetry emerges owing to the episodic nature of galactic activity. We have caught in the act the transitions from radio-loud to radio-quiet and back to radio-loud state in 3C328, hence we have got a proof that its activity is recurrent. 3C328 stands as a fine example of how the orientation of a double-lobed radio galaxy in 3D can significantly modify its apparent shape.