

Innermost region of the blazar S5 0716+714 from RadioAstron polarimetric observations at 22 GHz

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We present results of μas radio polarimetric imaging of one of the most studied BL Lac object S5 0716+714, observed with the RadioAstron space-VLBI mission. The source is well known because of its extreme and rapid variability through the whole electromagnetic spectrum. S5 0716+714 gamma-ray activity is strongly related to the inner jet morphology, which together with the short-scale variations at radio and optical bands makes the blazar the best candidate for an intrinsic origin of its intra-day variability (IDV).

Our EVN/Global VLBI observations of the source was made with the 10-m space radio antenna and eleven ground stations on 2015 January 3-4 at 22 GHz. The projected baselines reached 4-6 Earth's diameters in length, resulted in angular resolution of 24 μas , the highest for the studied source to-date.

The S5 0716+714 image revealed unprecedented elongation of the apparent base of jet within innermost 0.2 μas in direction, almost perpendicular to the larger-scale flow.

This is consistent with the temporal variations of the inner jet direction with the amplitude of about 60 degrees, resulted from our analysis of multi-epoch observations of the blazar within the VLBA-BU-BLAZAR monitoring program at 43 GHz. We suggest, that this fine-scale region of the S5 0716+714 jet may be responsible for the IDV and flaring activity of the source.

The source exhibits large-scale magnetic field, perpendicular to the jet flow, which is consistent with its helical geometry. We detect compact linearly polarized component in the innermost 0.2 μas of the jet, which coincides well with the position of a stationary feature, seen in other studies, and points on possible association with the recollimation shock.