

Polarimetric millimeter VLBI observations of 3C 84

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Synchrotron radiation from AGN jets can be linearly polarized up to ~70% in theory. However, the observed degree of linear polarization is usually much lower. The weak linear polarization could be due to (i) highly tangled magnetic fields in a turbulent plasma, (ii) high Faraday rotation and (iii) blending of polarized sub-components within the observing beam. The bright radio-galaxy 3C 84 (Perseus A, NGC 1275), which is located at the center of the Perseus Cluster is almost unpolarized at cm-wavelength, but features a complex morphology from sub-pc to pc scales. We performed deep polarization VLBI imaging using the Global mm-VLBI Array (GMVA) at 86 GHz including the 100m Green Bank Telescope. We obtain new images of 3C84 with a very high angular and spatial resolution of 50 μ as (250 Rs), which resolves the center of the galaxy where two-sided relativistic jets are formed. We also analyze quasi-simultaneous multi-wavelength data from the VLBA (15 and 43 GHz) and ALMA (97.5, 233.0, and 343.5 GHz) observations. In this talk, we report detection of significant linear polarization in the VLBI core at frequencies > 43 GHz and also a very high RM of $\sim 10^{(5-6)}$ rad/m² in the central region. The physical implications will be discussed.