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Investigating launching of black hole jets with the combined power of the EVN and the EHT

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Content

AGN-launched jets are a crucial element in the study of super-massive black holes (SMBH) and their closest surroundings. The formation of such jets, whether they are launched by magnetic field lines anchored to the accretion disc or directly connected to the black hole's (BH) ergosphere, is the subject of ongoing, extensive research.
3C 84, the compact radio source in the central galaxy NGC 1275 of the Perseus super-cluster, is a prime laboratory for testing such jet launching scenarios, as well as studying the innermost, sub-parsec AGN structure and jet origin. Very long baseline interferometry (VLBI) offers a unique view into the physical processes in action, in the immediate vicinity of BHs, unparalleled by other observational techniques. With VLBI at short wavelengths particular high angular resolutions are obtained.
Utilising such cm and mm-VLBI observations of 3C 84 with the European VLBI Network and the Event Horizon Telescope, we study the magnetic field strength and associated accretion flow around its central SMBH. This is possible, as VLBI measurements are capable of peering through the dusty torus surrounding the central engine of 3C 84, which is known to block the line of sight to the sub-parsec counter-jet via free-free absorption. Furthermore, we study the magnetic field's signature in the core region, as manifested in polarised light. As part of this analysis we compare our observations to relativistic magneto-hydrodynamic simulations. Finally, we investigate the effect of instabilities on the shape of the jet's parsec-scale funnel and try to connect them to its historical evolution. In this talk I will present our most recent results and offer a comprehensive summary of BH jet launching in AGN.

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