

Is PKS 1540–077 a Compact Symmetric Object or a SMBH Pair?

We present new VLBI results on PKS 1540–077, a GHz-Peaked Spectrum (GPS) source and a strong candidate for a parsec-scale dual supermassive black hole (SMBH) system. Previous VLBA observations at 5 and 8 GHz revealed two compact, flat-spectrum components separated by ~ 130 pc, with no significant relative motion, inconsistent with typical jet dynamics. Our recent 22 GHz EAVN observation confirms that both components remain compact and unresolved at higher frequencies. These results strongly support the scenario of two active nuclei rather than a compact symmetric object (CSO). With the development of the new simultaneous multi-frequency receiver on the KVN and INAF, future observations at 22, 43, and 86 GHz will enable us to accurately measure spectral indices, determine component compactness, and assess core-shift signatures, all crucial for differentiating between binary SMBHs and CSOs. The multi-band capability of KVN and INAF will allow precise astrometric registration, further constraining the physical nature of this intriguing source. PKS 1540–077 may represent the second confirmed pc-scale dual SMBH, providing an ideal laboratory for studying black hole pairing and feedback in the late stages of galaxy evolution.

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