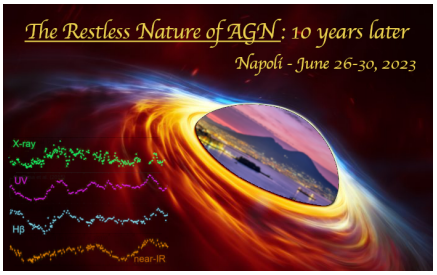

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Candidate sub-kpc dual SMBHs revealed with variability-induced jitters of quasars

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Dual super massive black holes at sub-kpc to kpc scales are the products of galaxy mergers and the progenitors of eventually coalescing binary SMBHs. Dual AGNs or off-nucleus AGNs may be witnessed if both or one of the dual SMBHs are accreting. Despite its rarity, such systems are essential for learning the dynamical evolution of binary SMBHs as well as the process of galaxy merging. Recently a novel and highly efficient astrometry-based method named varstrometry has been put forward to search for dual SMBHs at high redshift. This method shows that the unsynchronized flux variability of off-nucleus and dual AGNs will cause astrometric jitter detectable by Gaia without spatially resolving them. Based on varstrometry we select a rare sample of 5 high redshift radio quasars with clear Gaia astrometric jitters, and with e-MERLIN observations a single compact radio source is revealed for each of them. Clear Gaia-radio offsets of $\sim 9-60$ mas are deteced in all but one targets. The observed Gaia jitters appear consistent with the expected values. These detected Gaia-radio offsets suggest these candidate dual SMBHs may have projected separations as small as $\sim$ 0.01 - $0.1''$ ($\sim$ 0.1 kpc, depending on the optical flux ratio of two SMBHs).

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