

A preview of SKA-VLBI: a cosmological application of strong lensing and VLBI

Monday, 6 May 2024 17:23 (2 minutes)

The Λ CDM model shows inconsistencies with observations on galactic and sub-galactic scales that are exemplified by the "missing satellite problem". Despite the large number of sub-halos predicted in the Local Group, only a few galactic satellites have actually been observed. At high redshift *strong gravitational lensing* can probe the presence of these sub-halos by means of their gravitational effect, which is expected to be at milliarcsecond scale. Some specific gravitational systems show deviations from the predictions of a smooth model, called *anomalies*, that are often attributed to the presence of sub-halos.

In this poster we present the analysis of a global-VLBI observation of the strongly lensed jetted AGN JVAS B1555+375. JVAS B1555+375 is a quadruply imaged system with a strong flux ratio anomaly. Recent near-infrared observations revealed an edge-on disc in the lensing galaxy, which crosses directly over the pair of images exhibiting the anomaly. Our milliarcsecond and μ Jy/beam sensitivity observation detected only three of the four predicted images and revealed, for the first time, the presence of an astrometric anomaly. The baryonic ionized matter of the edge-on disc could be the dominant responsible for the observed anomalies. Our study confirms that not all lensing anomalies are due to dark matter sub-halos and not accounting for the full complexity of the lenses may alter the results of statistical studies. The present study with a heterogeneous global-VLBI array can be considered a precursor of SKA-VLBI, which will give us access to a statistically significant strong lensing sample at sub- μ Jy sensitivity on milliarcsecond scales.

keywords

Very Long Baseline Interferometry, gravitational lensing, cosmology, high redshift

In-person or online?

unsure

Career level

Student

Primary author: MALVOLTI, Filippo

Co-authors: SPINGOLA, Cristiana (INAF - Institute for Radioastronomy); DALLACASA, Daniele (University of Bologna, Astronomy Dept.)

Presenter: MALVOLTI, Filippo

Session Classification: Poster Sparklers