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Automated deep sub-arcsecond wide-field imaging of ELAIS-N1 with LOFAR

Wednesday, 8 May 2024 12:00 (15 minutes)

Recent work by Morabito et al. (2022) and Sweijen et al. (2022) introduced the first steps towards a wide-field imaging pipeline to reduce data from the Low Frequency Array (LOFAR) with all international stations included. Building upon their work, we have improved the pipeline for wide-field imaging by investigating and testing additional pipeline steps to increase the image quality and automation of the pipeline with 32h of LOFAR data of the ELAIS-N1 deep field. This effort led to a wide-field image at a resolution of 0.3" and a sensitivity of 17 μJy/beam, marking the deepest wide-field image at this resolution and frequency. In addition, we also generated wide-field images at 0.6" and 1.2", enabling comparisons of source detections across resolution and sensitivity.

We would like to present this work, as it will bring us closer to the realization of a fully automated LOFAR VLBI pipeline and will allow for the development of surveys similar to the LOFAR Two-metre Sky Survey (LoTSS; Shimwell et al. 2017, 2019, 2022; Williams et al. 2019), improving the 'standard resolution' of LOFAR from 6" to 0.3". This is an important next step to reveal the science hidden among the 90% of radio sources that are currently unresolved in LoTSS.

keywords

radio astronomy, wide-field imaging, VLBI, pipelines, automation, machine learning

In-person or online?

in-person

Career level

ECR

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