

# The Synoptic Wide-field e-MERLIN EVN Program (SWEEPs)

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The high angular resolution and sensitivity of VLBI offers a unique tool to identify and study AGN and star-formation activity. Radio imaging across a large range of angular scales is needed to determine the role of black hole feedback and jet-induced star formation in galaxies. All-sky VLBI surveys can answer these questions and find rare radio sources, such as gravitational lenses. Despite recent technical advances only a limited part of the sky has been observed within a few well-studied fields. To enter the realm of large statistics, a significantly larger area must be observed.

SWEEPs (Synoptic Wide-field e-MERLIN EVN Program) is a commensal survey mode for the e-MERLIN + EVN, where single-target PI-led observations are re-correlated at the position of all sources within 12 arcmins. The phase centres are selected using an e-MERLIN-only wide-field image generated during the initial correlation. This program can potentially observe ~9000 sources per year, yielding an expected 1900 VLBI detections without any additional observing. Here, we present preliminary results and methods from a pilot program, using a single target observation where we obtained 257 additional phase centres. In this study, we investigated imaging methods for the multiple angular scales of e-MERLIN + EVN, tested robust pipelines to accurately detect sources and studied the correlation and data processing requirements of this potential wide-field observing mode for the EVN. This understanding is important for its implementation as part of a future SKA-VLBI, a mode that will observe significantly more phase centres (1000s) due to SKA's increased sensitivity.

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