URSI AP-RASC, Sydney, Australia, 17-22 August 2025

Demonstrating Low-Frequency VLBI in the Southern Hemisphere for SKA-Low

T. Vernstrom*[(1)], C. Reynolds [(1)], S. Barker[(2)], G. Hampson[(2)]
(1) CSIRO Space & Astronomy, P.O. Box 1130, Bentley, WA 6102 Australia,
e-mail: Tessa.vernstrom@csiro.au
(2) CSIRO Space & Astronomy, PO Box 76, Epping, NSW 1710, Australia

SKA will enable a broad range of new science with exciting VLBI prospects. SKA-mid is poised to be a key element of global-scale VLBI arrays. However, currently the SKA-low baselines are limited to just around 70km and there are few resources to call upon to enable VLBI observations with SKA-Low. SKA-Low by itself will not provide the sub-arcsecond angular resolution required for maximising synergy with frontline optical/IR telescopes such as JWST. The planned tied-array mode does allow the capability to participate in VLBI observations. To make use of this mode for SKA-low, new stations or facilities need to be developed that can link with it.

With significant science being produced with LOFAR international baselines in the Northern hemisphere [e.g. 1,2], we at CSIRO are motivated to take the first steps to establish low-frequency VLBI capability in the Southern hemisphere. A modest project is sufficient to demonstrate capability, provide the basis of a long-term technology development pathway, and provide motivation for future expansion of SKA-Low to match the original vision of a continent-scale telescope. Our development project is called **LAMBDA: the Low-frequency Australian Megametre-Baseline Demonstrator Array.**

A full array would consist of several (4-6) low-frequency aperture arrays that will be located at sites of existing LBA telescopes across Australia. Although the project design is not motivated by an attempt to optimise imaging fidelity to achieve specific science goals, we will nevertheless seek to achieve a balanced mixture of intermediate- and long-baseline spacings. These stations will enable local studies of pulsars and stars, transient event follow-up and host localization, AGN and high-redshift science, and the flexible new backend will enable innovative single-station science as well. We will give an overview of the project, its status and future plans, and touch on science that can be enabled by the array.

1. L. K. Morabito; N. J. Jackson; S. Mooney; F. Sweijen; S. Badole; P. Kukreti; D. Venkattu; C. Groeneveld; A. Kappes; E. Bonnassieux et al., "Sub-arcsecond imaging with the International LOFAR Telescope", Astornomy & Astrophysics, 2022, doi: 10.1051/0004-6361/202140649

2. Groeneveld, C.; van Weeren, R. J.; Miley, G. K.; Morabito, L. K.; de Gasperin, F.; Callingham, J. R.; Sweijen, F.; Brüggen, M.; Botteon, A.; Offringa, A. et al.,"Pushing sub-arcsecond resolution imaging down to 30 MHz with the trans-European International LOFAR Telescope", Astronomy and Astrophysics, 658A, 2022, doi:10.1051/0004-6361/202141352