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Expanding the Global mm-VLBI Array with Multi-Band Receivers

The Global Millimetre VLBI Array (GMVA) is a high-sensitivity global millimetre VLBI instrument that operates at wavelengths of 3 mm and 7 mm. Recent enhancements, such as the inclusion of phased ALMA and the upgrade of the NOEMA observatory, have significantly improved the array's sensitivity and imaging capabilities. The GMVA now plays a central role in enabling high-resolution studies of active galactic nuclei, black hole environments and relativistic jet dynamics. In this contribution, we present updates on the array's scientific achievements, ongoing technical upgrades —including increased bandwidth and improved calibration strategies —and strengthened coordination with other arrays. A significant opportunity in this regard is offered by the implementation and prospects of the single-optical-path frequency-phase-transfer (FPT) technique, which is currently being deployed for the 13 mm/7 mm/3.5 mm option in most European antennas. We also report on the recent successful testing of the long APEX–IRAM 30 m baseline, where dual-frequency VLBI observations at 86 and 258 GHz demonstrated improved coherence and phase stability using FPT (Zhao et al.). Adopting such techniques across mm-VLBI arrays supported by multi-band receiver systems is set to substantially enhance high-frequency sensitivity and operational robustness, paving the way for the next generation of VLBI science.

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