

The International LOFAR Telescope: gearing up for the next decade

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LOFAR has a network of individually-owned low-frequency antenna stations, designed and built by ASTRON. All stations are connected by fibre to central processing facilities and a distributed archive. The International LOFAR Telescope (ILT; now a partnership with consortia spanning 9 countries) jointly exploits this distributed facility as the world's most powerful and versatile radio telescope in the frequency range below 240 MHz.

This talk will summarise recent LOFAR highlights, and will cover the scientific, technological, and governance headlines of the vision to ensure that LOFAR will continue to be available to the world's research community as a unique and highly impactful research infrastructure through 2030 and beyond.

Building on the successes of the past decade of steadily increasing and more versatile science output, LOFAR2.0 has been initiated as a major upgrade programme to capitalise on its unique strengths: frequency coverage to 30 MHz and even below, a sensitive Core in the Netherlands that can be coherently “beamformed”, and (sub)arcsecond angular resolution with baselines extending across Europe. The funded DUPLLO development implements concurrent observing across the LOFAR bands, and is key for a planned multi-year 10-90 MHz LOFAR2.0 all-sky survey that will remain unsurpassed well into the 2030s.

The Space Weather community is rapidly becoming aware of the potential for LOFAR for unique and important solar, heliospheric, and ionospheric observations. LOFAR4SW, a European-funded project, is taking a full inventory of potential novel use cases and stakeholders, and will deliver designs for significant augmentation of software and hardware capabilities, envisioned to be funded for implementation on LOFAR in several stages.

In keeping with the prominence of LOFAR on the European landscape, the partners have resolved to aim for the establishment of LOFAR ERIC (European Research Infrastructure Consortium). This will provide an up-to-date governance in which to embed new members seeking to join the existing partnership, and supporting coordinated development and operation of the joint LOFAR infrastructure.



Figure 1. The International LOFAR Telescope: map of participating countries and LOFAR station locations. There are 38 stations in the Netherlands. The Latvian station at Irbene was taken into operation in 2019; a station at Medicina, Italy is funded.