URSI GASS 2023, Sapporo, Japan, 19 – 26 August 2023

The International LOFAR Telescope:
A premier low-frequency radio facility for the 2030s and beyond

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The International LOFAR Telescope (ILT) partnership has grown to 10 countries. Its Open Access distributed infrastructure has now been in operation for over a decade as the world's most powerful low frequency radio telescope for a wide range of cutting-edge science; recent highlights will be given in this observatory report.

LOFAR is right now in the midst of both a major technological upgrade and a significant governance reinforcement, that will together anchor its position as cutting-edge research infrastructure for the global science community into the next decade. This observatory report will summarise the latest status of both developments.

LOFAR2.0 technology, designed at ASTRON, is being readied for implementation. It will enable simultaneous observing in the two LOFAR bands 10 – 80 MHz and 110 – 240 MHz. With the station network fully fibre-connected, from the dense core in the Netherlands and throughout Europe, this provides a tremendous range of instantaneous field-of-view with unrivaled angular resolution. The LOFAR central processing pipelines and comprehensive data archive facilities are being upgraded to match. An initial LOFAR2.0 Large Programme portfolio of science projects, with wide community participation, is being composed.

Visions are being developed already for longer-term technological developments. These are likely to capitalise further on LOFAR's unique strengths below 50 MHz, and even down to the ionospheric cutoff frequency. The ongoing development along this route is the ability to cross-correlate the independent NenuFAR telescope as a super-station seamlessly within LOFAR. A further increase of LOFAR's flexibility and science output capacity is envisaged through the generation of multiple simultaneous wide-band station beams. The ongoing step in that direction is the DANTE project, designing a new high-band antenna tile beamformer to generate two independent beams on the sky simultaneously. For this, the LOFAR4SW project has identified important and unique solar and space weather use cases, that require long-term targeted monitoring in parallel to ongoing other science.

The pan-European nature of LOFAR and its diverse and steadily growing partnership motivated the decision to form LOFAR ERIC (European Research Infrastructure Consortium; a legal entity established by the European Commission, in which countries participate at national level). LOFAR ERIC will serve as a robust governing entity for LOFAR, and will provide long-term stability to the infrastructure with a common vision and long-term policies and finances. The LOFAR ERIC application process is carried out under the leadership of the Netherlands Ministry of Education, Culture, and Science. The second and last step of the application is under review by the European Commission; the ILT aims to establishing LOFAR ERIC as its successor within 2023.

Figure 1. The International LOFAR Telescope collaboration: participating countries and LOFAR station locations.