

## Scintillation with EISCAT, KAIRA, and LOFAR: New Perspectives on the Ionosphere and Interplanetary Medium

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The wide bandwidth of new radio instruments such as the EISCAT 3D pathfinder, the Kilpisjärvi Atmospheric Imaging Radar Array (KAIRA), and the LOw Frequency ARray (LOFAR) is opening up new perspectives in the study of interplanetary and ionospheric scintillation. For the first time, the evolution of scintillation from weak to strong scattering regimes has been directly observed in dynamic spectra. This is most striking in observations of ionospheric scintillation where direct observing at station level has enabled a combination of low-band and high-band modes to be used to cover the full available frequency bandwidth from 10 to 250 MHz. "Scintillation arcs", seen previously in two-dimensional power spectra from interstellar scintillation observations, have been noted for the first time using observations of ionospheric scintillation. This offers new methods of studying the plasma structures giving rise to the scintillation. EISCAT and the ESR have been used for observations of interplanetary scintillation (IPS) for many years. The recent upgrade of the EISCAT remote dishes to VHF frequencies offers the opportunity to compare the more traditional IPS observations with those from new instruments in the region of the heliosphere where most evolution of solar wind and transient structures occurs.