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EISCAT 3D - The Next Generation European Incoherent Scatter Radar System

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A major new research European infrastructure will be constructed in Northern Scandinavia, combining several very large phased-array transmitters/receivers with multiple receiver arrays. The new EISCAT 3D radar system has a design goal of ten times higher temporal and spatial resolution than the present radars, a volumetric radar imaging capability in an extended spatial area with simultaneous full-vector drift velocities, avoiding spatial and temporal ambiguities, having continuous operation modes, short baseline interferometry capability for imaging sub-beamwidth scales, real-time data access for applications and extensive data archiving facilities. Some arrays are very large, in the scale of 30 000 individual antenna elements. The receiver arrays will be located at 50-150 km distance from the illuminators, so that the total system will comprise in the order of 100 000 elements. These extremely large scale atmospheric and space environment radar arrays open up unprecedented science and technology application opportunities, well beyond the traditional ground-based ionospheric remote sensing role of the old incoherent scatter radars.

EISCAT 3D was accepted on the European Roadmap for Research Infrastructures by the European Strategy Forum on Research Infrastructures in December 2008. The facility will be constructed as a modular concept by year 2015. The current status of the project is approaching the end of the first 4 MEUR design study, conducted during 2005-2009 by EISCAT Scientific Association, University of Tromsø, Luleå University of Technology, Swedish Institute of Space Physics, Rutherford Appleton Laboratory, and supported by EU FP6 funding. EISCAT Scientific Association operates currently three incoherent scatter radars in Northern Scandinavia on behalf of its associate members in Finland, China, Germany, Japan, Norway, Sweden and United Kingdom, as well as currently supporting partners in France and Russia.