

Capabilities of the Upgraded EISCAT High-Power HF Facility

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The high-power HF (High Frequency) facility (commonly known as Heating) near Tromsø, Norway, which is an essential part of the EISCAT (European Incoherent SCATter) Scientific Association, has been upgraded in certain key areas in recent years. It is one of only four similar facilities in the world operating at present. An updated description of the facility is given, together with scientific motivation and some results. The main high-power parts such as transmitters, feed-system and antennas remain essentially the same as built in the late 1970s. The improvements are in the areas of radio frequency waveform generation, computer control and monitoring. In particular, fast stepping in frequency is now possible, an important aspect in examining features close to harmonics of the electron gyrofrequency. Realistic modelling of the antenna gain gives improved estimates of the total effective radiated power for both wanted and unwanted circular polarizations.

A new HF radar mode can be used for mesospheric and magnetospheric probing. The coaxial switches to one of the antenna arrays have been modified to allow reception while transmitting on another array. A digital beam former has been implemented, using 6 USRP direct sampling receivers to provide receiver beam steering in the north-south plane. Passive radio measurements, showing galactic radio sources and possibly ionospheric emissions, demonstrate some of the capability of the new receiving system.