

Probing the ionospheric Alfvén resonator using active experimental methods

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The ionospheric Alfvén resonator (IAR) is a cavity bounded by the ionosphere at the bottom and the peak in the Alfvén velocity profile at the upper limit. This cavity traps naturally occurring waves with frequencies of a few Hz and their signatures can be identified in the form of Spectral Resonance Structures (SRS) in dynamic spectra derived from induction coil magnetometers located on the ground. The new SPEAR radar system, located on Spitsbergen, is a high power ionospheric modification facility which can excite the IAR and enhance SRS by modulation of the electrojet at an appropriate frequency. Perhaps the most significant discovery as a result of using this technique is that the field parallel electric fields can be stimulated at the upper boundary of the IAR. Thus SPEAR offers a means of studying the naturally occurring particle acceleration processes which lead to the formation of the aurora, a very important area of research at present. This presentation will highlight recent results from these experiments.