

## **HF transmitter power experiments and the ISR diagnostics at Arecibo**

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The Arecibo - HF Facility send an electromagnetic wave that interacts with the ionospheric plasma exciting Langmuir oscillations and ion wave turbulence. These artificial changes in the ionosphere are observed by the Arecibo incoherent scatter radar (ISR) that is sensitive to ion-acoustic waves (IAW) and Langmuir waves (LW). LW propagation characteristics change with plasma frequency and electron temperature variations. The cold ionospheric plasma frequency is proportional to the square root of electron density. The plasma frequency is responsible for the plasma line (PL) detected by the ISR. The ion line (IL) is mostly proportional to the ion acoustic frequency. Except for artificial enhancements of the electron temperature. The ion acoustic frequency is related to the ratio between electron and ion temperatures. The HF-enhanced ILs and PLs are mostly related to changes in electron or ion temperature and electron density induced by the plasma - HF wave interaction.

The amplitude and shape of the HF-enhanced IL and PL changes accordingly to the HF transmitted power or HF-wave amplitude. This paper presents the results form tailored experiments designed to measure the sensitivity between the ISR and the HF transmission power, even when the HF transmitter power is low. The analysis shows that even a very low HF transmitted power, the ISR is able to detect enhanced IL and PL. Analysis of the line shapes is also shown and correlated with the changes in HF transmitted power.