APS -63rd Annual Meeting of the APS Division of Plasma Physics - Event

Volume 66, Number 13

Monday–Friday, November 8–12, 2021; Pittsburgh, PA

Session TP11: Poster Session VII:
Fundamental Plasma Physics - Waves, Instabilities, and Shocks; Turbulence and Transport Phenomena; Single-Component Plasmas
MFE- High Field & Long Pulse Tokamaks: Pinch, Mirrors, Spheromak, and Other Magnetic Relaxation
9:30 AM - 12:30 PM

Thursday, November 11, 2021

Room: Hall A

Abstract: TP11.00034 : Characterisation of a helicon source for non-linear microwave coupling experiments in a magnetised plasma*

← Abstract →

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As a non-linear medium, parametric instabilities arise when powerful EM waves propagate in plasma. Such effects are seen in laser-plasma, RF–ionospheric and tokamak heating scenarios. Fusion plasmas in a spherical aspect tokamak are difficult to heat due to their high densities, making the lower cyclotron resonances unreachable via direct means. Beat-wave interactions involving multiple EM waves can be used to excite such resonances. Laser, fusion and ionospheric environments pose diagnostic challenges to fully investigate these processes and measure their impact on macroscopic properties such as density, temperature and energy distributions. For this reason a helicon source driven between 3 & 30 MHz has been commissioned. The 1 m diameter, 3 m long stainless-steel vessel is immersed in a static B-field of up to 90 mT formed by 6 electromagnets. The resulting relatively tenuous (10^{18} m^{-3}), cool (<10 eV) plasma is ideal for parametric wave coupling experiments with powerful microwave beams. Microwave interferometry, frequency compensated Langmuir and RF pickup probes will diagnose how these processes impact the plasma. This paper presents initial experiments characterising the apparatus, with comparison to numerical simulations.

*Supported by UK EPSRC (EP/R004773/1).