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Anisotropy in Microwave Scattering by a Small Plasma in a Magnetic Field[1] CHRISTOPHER GALEA, MIKHAIL SHNEIDER, Princeton University, RICHARD MILES, Texas A&M University — Microwave scattering by a small plasma has been modeled in the literature, resulting in microwave scattering diagnostics such as radar resonance-enhanced multi-photon ionization (Radar REMPI) and the Rayleigh microwave scattering (RMS) technique. However, it has not yet been considered what the effect of an external magnetic field would be on the aforementioned diagnostics. A model based on the transport properties of plasma in a magnetic field has been developed to capture the effects of an external magnetic field on the microwave scattering by a small plasma. In the presence of an external magnetic field, the electron mobility becomes a tensor due to the differing transport properties of electrons along and perpendicular to the magnetic field, which in turn affects the microwave scattering signal both in magnitude and in polarization. The dependences of the scattered microwave signal magnitudes for the various polarizations on both the Hall parameter and the relative magnetic field orientation are derived, showing potential for remote measurements of magnetic field strength and topology. Potential limitations of the proposed measurement techniques will also be discussed.

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