

Development of a polarization resolved spectroscopic diagnostic for measurements of the magnetic field in the Caltech coaxial magnetized plasma jet experiment

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Abstract

In the Caltech coaxial magnetized plasma jet experiment, fundamental studies are carried out relevant to spheromak formation, astrophysical jet formation/propagation, solar coronal physics, and the general behavior of twisted magnetic flux tubes that intercept a boundary. A non-perturbing visible spectroscopic method has been implemented to observe the Zeeman splitting in the emission spectra in order to measure the magnetic field spatial profile. We designed and constructed a polarization-resolving optical system that can simultaneously detect left- and right-circularly polarized emission with both high throughput and small extinction ratio. By applying this system to NII spectra, the spatially resolved magnetic field magnitude was determined using an inversion method.