Session 3

Simulating the Solar Corona in the Forbidden and Permitted Lines with Forward Modeling

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The magnetic field in the corona is important for understanding solar activity. However, routine observations of the linear polarization has only been achieved in the visible/IR which provides information about coronal magnetic direction and topology. To provide a constrain on the coronal magnetic field strength, the unsaturated, or critical regime of the magnetic Hanle effect which is potentially observable in permitted lines for example in the UV, is a promising candidate. To better understand how such observations might be used together in the future to diagnose the coronal magnetic field, a side-by-side comparison of forbidden versus permitted linear polarization signatures, which examines the transition from the unsaturated to the saturated regime, is investigated in this work. In addition, we use an analytic 3D flux rope model to demonstrate the Hanle effect for the line-of-sight versus plane-of-sky (POS) components of the magnetic field. As expected, the linear polarization in the unsaturated regime will vary monotonically with increasing magnetic field strength for regions where the magnetic field is along the observer's line of sight. The POS component of the field produces a linear polarization signature that varies with both the field strength and direction in the unsaturated regime. Once the magnetic field is strong enough that the effect is saturated, the resulting linear polarization signal is essentially the same for the forbidden and permitted lines.