Aberystwyth Workshop Notes 6 May 2009 Session 2 Chair: Periasamy Manoharan Notetaker: John Clover

E.A. Jensen - Simulated CME Full-Sky Faraday Rotation

Model Parameters: Flux rope orientation, handedness, EM field magnitude, source density.

2003 Halloween Event: T. Mulligan non-force free fits HCE data

Flux Rope Orientation Test: Good match to magnetic field

Required parameters for sheath region studies <Nrope Brope> / <Nsheath Bsheath> = 1. Basic flux rope > 1, sheath << 1

Conclusions:

- UCSD model measures Faraday Rotation
- Average FR in CME must be greater than sheath
- FR dependent on sensitivity

Cheshei - What is the difference between magnetic cloud and flux rope? Jensen - Magnetic cloud is force-free flux rope

Chashei - Radio Sounding of the Near-Sun Plasma Using Polarized Pulsar Pulses

Propagation Effects:

- Dispersion delay
- Scattering of pulses on electron density fluctuations
- faraday rotation of polarized plane

Observation details: 70,000 m² at 111 MHz Targets: B0525+21 with 40-50% polarization. Rotation measure est. <6 rad m⁻² Crab Nebula with 10% polarization. Better S/N. Rotation measure est. <3 rad m⁻² Compared with Bird's estimate of <10 rad m⁻²

Estimated densities were lower than earlier studies (Rankin)

Cheshei concludes that the reason for the difference in density is that these observations were made at solar minimum, while the previous observations were at solar maximum. Also the closest approach of the source was at high heliolatitudes.

The radial density profile shows the acceleration of fast wind up to 5-10 solar radii.

E.A. Jensen - Review of Columnar Density Changes with Differential Doppler Shift

Transmissions from interplanetary spacecraft which pass close to the sun take a different path based on Snell's Law.

Can relate doppler shift to a density.

Technical Application: Columnar Density, Angular Offset.

M.M. Bisi for P. Hick - Faraday Rotation: Expected Possible Heliospheric Analyses from Polarized Radio Sources

UCSD can reconstruct FR using wso/nso magnetic field data. Also, UCSD can reconstruct solar wind structure using EISCAT data despite the limited amount of sources available.

SMEI reconstructions are shown and brief mention that B. V. Jackson has modified the UCSD tomography program to also include insitu instrument measurements as sources in the reconstruction.

Discussion

There is great interest in modifying the tomography program to use scintillation index and cross-correlation functions to generate the solar wind parameters, rather than the standard speed and g-level it currently uses.

MWA is preparing for data and beginning to figure out what observables will look like. Anyone interested in contributing, contact Divya.

Action Item: Pick a short list of events where more investigation is desired. Events discussed the following day:

- 24-25 Jan 2007
- 17-22 Nov 2007
- 11-15 and 24-28 Apr 2008

J.A. Gonzalez-Esparza - Propagation of Fast ICMEs and Interplanetary Shocks

Study used TNR-Waves data.

Does the velocity become constant after fast acceleration?

Data was fit to a gaussian, but there is some discussion as to the error bars and if the sigma of the gaussian really is the error.