

Error Estimates in the Measurements of Mass and Energy in White Light CMEs

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Abstract. Due to the optically thin nature of the white light emission, all measurements of the energetics and dynamics of a CME are based on sky-plane projected quantities. The extent and distribution of the CME material along the line of sight is unknown. Thus, CME measurements have an inherent degree of uncertainty. In this paper, I identify the various (possible) sources of errors associated with measurements of CME mass and energy (e.g., instrumental, random, projections effects, etc) and give an error budget for the final measurements. I apply these errors to the statistics of mass and energy for several thousand CMEs observed with LASCO in 1996-2003.

Keywords. Sun: coronal mass ejections (CMEs)

Discussion

KAHLER: Are your error estimates independent of any uncertainties in the F-corona brightness?

VOURLIDAS: In this talk, I refer only to excess brightness (mass) measurement (and errors). In this case, the F-corona is subtracted automatically since we take $I_{CME} - I_{PREVENT}$ and the F-corona does not affect the measurements.

KOUTCHMY: Looking along a time sequence, did you check the mass conservation equation or did you see decrease or increase of the overall mass of the CME(s)?

VOURLIDAS: We find that for the majority of the events we have studied ($\sim 2500/4500$) the mass reached a value above $10 R_{\odot}$ (e.g. Vourlidas *et al.* 2002, in Proc. of the 10th Europe. Sol. Phys. Mtg, Prague, Czech Rep., Wilson, A. (ed), ESA SP-506, Dec 2002, p. 91).