

Sun, Space Weather, and Solar-Stellar Connection



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Revisiting the Relationship Between Prominence Material and CME Core Structures

A Coronal Mass Ejection (CME) is a large-scale eruption of plasma and magnetic fields from the Sun into interplanetary space. In coronagraph observations, around one-third of CMEs exhibit a characteristic three-part structure consisting of a bright inner core, an outer leading edge, and a darker cavity in the middle. However, observations of the inner corona suggest this three-part structure is more common than previously thought. The traditional view that prominence material forms the bright inner core and that the cavity represents a low-density magnetic flux rope has recently been questioned. Some studies propose that the bright core may instead result from the geometric projection of a twisted flux rope. In contrast, more recent observations from the Solar Orbiter in the He II 304 Å passband of the EU/Full Sun Imager have detected prominence material as far as six solar radii. To reassess the association between prominence material and the bright inner core of CMEs, we analyzed data from GONG H α , MLSO K-Cor (white light), and AIA 304 Å observations, focusing on limb CMEs with visible prominence eruptions in H α . Our findings show a strong correlation between H α and white-light observations of the fine structure of CME cores in the inner corona. In many cases, these structures were further traced into the outer corona within the LASCO/C2 field of view. Our initial results suggest the presence of prominence material within the inner core of CMEs.

Contribution Type

Theme

Energetic Phenomena

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