

THE STRUCTURE OF CORONAL MASS EJECTIONS RECORDED BY THE K-CORONAGRAPH AT MAUNA LOA SOLAR OBSERVATORY

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Previous survey studies reported that coronal mass ejections (CMEs) can exhibit various structures in white-light coronagraphs, and ~30% of them have the typical three-part feature in the high corona (e.g., 2–6 Re), which has been taken as the prototypical structure of CMEs. It is widely accepted that CMEs result from eruption of magnetic flux ropes (MFRs), and the three-part structure can be understood easily by means of the MFR eruption. It is interesting and significant to answer why only ~30% of CMEs have the three-part feature in previous studies. Here we conduct a synthesis of the CME structure in the field of view (FOV) of K-Coronagraph (1.05–3 Re). In total, 369 CMEs are observed from 2013 September to 2022 November. After inspecting the CMEs one by one through joint observations of the Atmospheric Imaging Assembly, K-Coronagraph, and LASCO/C2, we find 71 events according to the criteria: (1) limb event; (2) normal CME, i.e. angular width $\geq 30^\circ$; (3) K-Coronagraph caught the early eruption stage. All (or more than 90% considering several ambiguous events) of the 71 CMEs exhibit the three-part feature in the FOV of K-Coronagraph, while only 30–40% have the feature in the C2 FOV (2–6 Re). For the first time, our studies show that 90–100% and 30–40% of normal CMEs possess the three-part structure in the low and high corona, respectively, which demonstrates that many CMEs can lose the three-part feature during their early evolutions, and strongly supports that most (if not all) CMEs have the MFR structures.

REFERENCES

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