Evidence for a current sheet forming in the wake of a Coronal Mass Ejection from multi-viewpoint coronagraph observations

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Ray-like features observed by coronagraphs in the wake of Coronal Mass Ejections (CMEs) are sometimes interpreted as the white light counterparts of current sheets (CSs) produced by the eruption. The 3D geometry of these ray-like features is largely unknown and its knowledge should clarify their association to the CS and place constraints on CME physics and coronal conditions. With this study we test these important implications for the first time. An example of such a post-CME ray was observed by various coronagraphs, including these of the SECCHI instrument suite of the STEREO twin spacecraft and the Large Angle Spectrometric Coronagraph LASCO onboard the Solar and Heliospheric Observatory (SOHO). The ray was observed in the aftermath of a CME which occurred on 9 April 2008. The twin STEREO spacecraft were separated by about degrees on that day. This significant separation combined with a third "eye" view supplied by LASCO allow for a truly multi-viewpoint observation of the ray and of the CME. We applied 3D forward geometrical modeling to the CME and to the ray as simultaneously viewed by SECCHI-A and B and by SECCHI-A and LASCO, respectively. We found that the ray can be approximated by a rectangular slab, nearly aligned with the CME axis, and much smaller than the CME in both terms of thickness and depth (~ 0.05 and 0.15 Rsun respectively). We found that the ray and CME are significantly displaced from the associated post-CME flaring loops. The properties and location of the ray are fully consistent with the expectations of the standard CME theories for post-CME current sheets. Therefore, our multi-viewpoint observations supply strong evidence that the observed post-CME ray is indeed related to a post-CME current sheet.

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