MULTIPOINT ANALYSIS OF CME-CME INTERACTION

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Throughout the solar cycle the frequency of coronal mass ejections (CMEs) ranges from less than 0.5 a day during solar minimum to more than 6 a day during solar maximum. Given the average angular width of CMEs of 45 degrees the probability of their collisions and interactions while propagating through the heliosphere becomes an important factor for space weather forecasting, especially during solar maxima. The interaction alters parameters of interplanetary CMEs considerably, making it harder to predict their geoeffectivity. In this study, we present and discuss the first CME-CME interaction event measured successively in-situ by three spacecraft. The configuration of space instruments allows to track the evolution of their collision and get insight into its mechanism. We summarize the results of various analysis methods, including the FRi3D model of CMEs [1], and products of the HELiospheric Cataloguing, Analysis and Techniques Service (HELCATS). Given the typical frequency rate of CMEs, their average size and spacecraft orbits the probability of one such event to be measured during one year of observations can be roughly estimated as less than 5%. The latter means that even during the next 10 years of solar observations there is only a 50% chance to get such a detailed insight on CME-CME interaction.

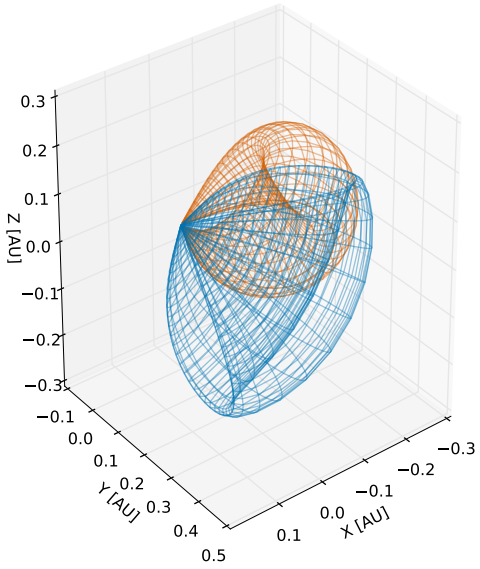

Figure 1: Interacting CMEs modelled with the FRi3D model.

[1] A. Isavnin, Astrophys. J. 833 (2016).