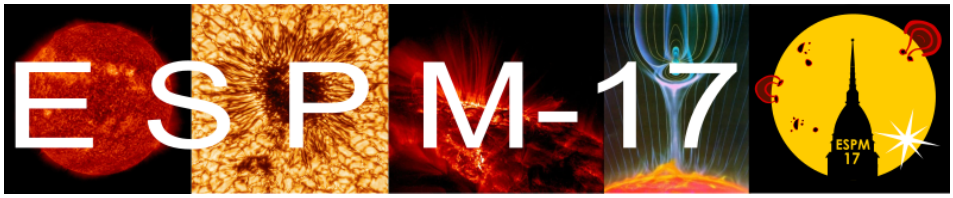

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Identifying and Tracking CME Flux Ropes On The Example of AR12473

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The study of coronal mass ejection triggering and early evolution necessitates numerical modelling, as measuring the coronal magnetic field is challenging. A key ingredient of the modelling efforts is to reliably identify and track the underlying magnetic structure of the eruption, the magnetic flux rope (MFR), in the simulation data. To achieve this, we developed an extraction and tracking scheme for MFRs, wrapped into a user-friendly GUI called GUITAR (GUI for Tracking and Analysing flux Ropes). The method builds upon a suitable MFR proxy, such as the twist of magnetic field lines, and combines it with mathematical morphology (MM) algorithms. The basic principle of MM algorithms is the comparison of an image with a so-called structuring element. In the context of MFRs, these algorithms are useful tools to identify the MFRs. We apply this scheme with GUITAR to a time-dependent data-driven magnetofrictional simulation of active region AR12473. We identify the MFR, analyse the evolution of its properties and track the flux rope from its formation until the eruption from the simulation domain. Furthermore, we demonstrate that it is a multi-MFR structure and analyse its large-scale evolution and triggering mechanism.

Primary authors: WAGNER, Andreas (University of Helsinki); PRICE, Daniel (University of Helsinki); KILPUA, Emilia (University of Helsinki); POMOELL, Jens (University of Helsinki); BOURGEOIS, Slava (University of Coimbra); Prof. POEDTS, Stefaan (KU Leuven)

Presenter: WAGNER, Andreas (University of Helsinki)

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