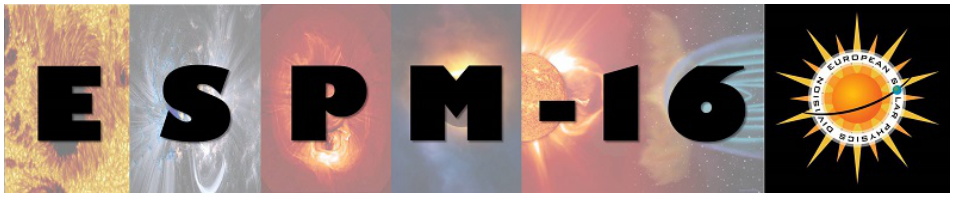

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Relative field line helicity of active region 11158

Tuesday, 7 September 2021 10:18 (13 minutes)

Magnetic helicity is a physical quantity of great importance in the study of magnetized plasmas as it is conserved in ideal magneto-hydrodynamics and slowly deteriorating in non-ideal conditions such as magnetic reconnection. A meaningful way of defining a density for magnetic helicity is through field line helicity, which, in solar conditions, is expressed by relative field line helicity (RFLH). In this work we study in detail the behaviour of RFLH in a solar active region (AR) for the first time. The target AR is the large, well-studied, eruptive AR 11158. The computation of RFLH is based on a high-quality non-linear force-free reconstruction of the AR coronal magnetic field, and on the recent developments in its computational methodology. The derived photospheric morphology of RFLH is very different than that of the magnetic field or the electrical current. The large decrease in the value of helicity during an X-class flare of the AR is also depicted in the photospheric morphology of RFLH. Moreover, the area of the RFLH decrease coincides with the location of a flux rope, that is, of the magnetic structure that later erupted. The use of RFLH can thus provide important information about the value and location of the magnetic helicity expelled from the solar atmosphere during eruptive events.

Student poster?

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