

Magnetic configuration responsible for solar global eruptions

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The emergence process of the magnetic field into the solar atmosphere plays an essential role in determining the configuration of the magnetic field and its activity on the Sun. This talk is focused on how much the magnetic flux contained by a flux tube emerges into the solar atmosphere, which is key to understanding the physical mechanism of solar eruptions. By comparing a kinematic model of an emerging flux tube to a series of magnetohydrodynamic simulations, we derive the characteristics of the emergence process, showing how it depends on the pre-emerged state of the magnetic field such as the radius of a flux tube, field strength, field-line twist and wavelength of undulation assumed by the flux tube. We also discuss the relationship between magnetic configurations and their stability on the Sun.