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Theory and Models of Flare/CME Onset

Monday, 24 May 2021 13:45 (25 minutes)

The onset of eruptive flare energy release requires both a buildup of stored energy and a trigger for the release of that energy. This talk will review key models of how this storage and release occurs in solar eruptions, in particular for breakout eruptions and for torus instability eruptions. In both cases, the eruptions require the buildup of free magnetic energy in the form of sheared field. For the breakout mechanism the energy is built up as sheared magnetic fields in coronal arcades, while for the torus instability the energy is built up as a combination of axial and twist field in coronal flux ropes. We will review recent work on the buildup of this energy to eruptive states, both via velocity shearing at the photosphere and via the emergence of sheared flux from the convection zone into the corona. Then we will review recent work exploring how the emergence of new magnetic flux into the corona can act as a trigger for these eruptive events. Much of the recent work to be discussed here is being carried out within the framework of NASA's Living with a Star focused science team on Understanding the Onset of Major Solar Eruptions.

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