

Abstract for Workshop on Coronal Magnetism, Boulder, CO

The Magnetic Origins of Solar Activity

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The defining physical property of the Sun's corona is that the magnetic field dominates the plasma. This property is the genesis for all solar activity ranging from quasi-steady coronal loops to the giant magnetic explosions observed as coronal mass ejections/eruptive flares. The coronal magnetic field is also the fundamental driver of all space weather; consequently, understanding the structure and dynamics of the field, especially its free energy, has long been a central objective in Heliophysics. The main obstacle to achieving this understanding has been the lack of accurate direct measurements of the coronal field. Most attempts to determine the magnetic free energy have relied on extrapolation of photospheric measurements, a notoriously unreliable procedure. In this presentation I will discuss what measurements of the coronal field would be most effective for understanding solar activity. Not surprisingly, the key process for driving solar activity is magnetic reconnection. I will discuss, therefore, how next-generation measurements of the coronal field will allow us to understand not only the origins of space weather, but also one of the most important fundamental processes in cosmic and laboratory plasmas.

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