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Magnetic Reconnection and Energy Release in Solar Flares

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In the past twenty years, solar flare observations have demonstrated a few fascinating aspects of fast reconnection responsible for impulsive energy release in the solar corona. A flare consists of a cluster of sequentially formed coronal loops and chromosphere bright kernels mapping the feet of these loops. These are believed to reflect the intermittent nature of reconnection, indicating that reconnection and subsequent energy release are temporally and spatially fragmented. What is the physical nature of the fragmentation? What are the basic scales of these fragments? Can observational measurements at present or in the near future provide the elementary quantities of reconnection and energy release? On the other hand, observations of the apparently ordered spread of brightening of flare kernels or loops suggest that the flare, or reconnection, progress is not entirely sporadic. What are the causes or consequences of such an organization? Whereas nature's purpose of reconnection is to release energy, the link between reconnection and energy release has been largely missing. It has not been clear how, and by how much, the free magnetic energy accessible via reconnection is released in packets and converted to other forms. This talk will report some recent effort to study reconnection dynamics and measure energy released in reconnection events.