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X-ray Measurements and Analytic Models of a Laboratory Solar Coronal Loop Merging Simulation RORY PERKINS, PAUL BELLAN, California Institute of Technology — Solar coronal loops typically erupt abruptly after long quiescent periods. Such eruptions might be initiated by interactions between two adjacent loops; this idea was explored experimentally in a laboratory simulation where two plasma-filled flux tubes merge in either a co-helicity or counter-helicity arrangement (J.F. Hansen, S.K.P. Tripathi, and P.M. Bellan, Phys. Plasma 2, 3177(2004)). The counter-helicity arrangement produces a bright region with enhanced soft x-ray emission. We are investigating such mergings with a new diagnostic array of EUV photo-detectors of the type described by S.J. Zweben, R.J. Taylor, Plasma Physics, Vol. 23, No. 4(1981), and with analytic studies of particle orbits in the regions between two flux tubes. The EUV array provides means for obtaining spatially and temporally resolved measurements of radiation between 10 and 120 nm. Such resolution is needed to observe the bright regions. Special precautions are taken against capacitive coupling, incoming plasma, and electrical noise. We model the orbits of individual particles in our experiment to understand the merging process. These models suggest that particle trajectories divide into two classes: those confined to a single flux tube and those that freely move between adjacent flux tubes. These models also suggest how trajectories transition from the former to the latter.

Rory Perkins
California Institute of Technology

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