Pontin, D. - University of Dundee

Energy release in braided coronal loops

We discuss the dynamic consequences of magnetic field line braiding in coronal loops. We address the existence of braided force-free equilibria, and demonstrate that these equilibria must contain current layers whose thickness becomes increasingly small for increasing field complexity. The implication for the corona is that if one considers a line-tied coronal loop that is driven by photospheric motions, then the eventual onset of reconnection and energy release is inevitable. The analysis allows us to estimate the critical braiding threshold for onset of energy release in the corona. Once the initial reconnection event is triggered, MHD simulations show that a turbulent relaxation of the loop ensues. The conversion of magnetic to thermal energy during this relaxation will be discussed. We will also address the expected observational signatures of energy release in such a braided coronal loop.