The Structure of Coronal Loops

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It is widely believed that the simple coronal loops observed by XUV imagers, such as EIT, TRACE, or XRT, actually have a complex internal structure consisting of many (perhaps hundreds) of unresolved, interwoven "strands". According to the nanoflare model, photospheric motions tangle the strands, causing them to reconnect and release the energy required to produce the observed loop plasma. Although the strands, themselves, are unresolved by present-generation imagers, there is compelling evidence for their existence and for the nanoflare model from analysis of loop intensities and temporal evolution. A problem with this scenario is that, although reconnection can eliminate some of the strand tangles, it cannot destroy helicity, which should eventually build up to observable scales. We consider, therefore, the injection and evolution of helicity by the nanoflare process and its implications for the observed structure of loops and the large-scale corona. We argue that helicity does survive and build up to observable levels, but on spatial and temporal scales larger than those of coronal loops. We discuss the implications of these results for coronal loops and the corona, in general.

This work has been supported by the NASA HTP, SR&T, and LWS programs.