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Identifying Observables that Discriminate Between Impulsive and Footpoint Heating: Long Time Delays

Observations of solar coronal loops have identified several common loop characteristics, including that loops appear to cool and have higher than expected densities. Recent analysis of a small active region found long time delays (~6000 s) between AIA channels. In this talk, we investigate whether two potential heating scenarios can recreate these long time delays. One scenario is that the loops are formed of many strands, each heated independently by a series of small-scale impulsive heating events, or nanoflares. Another hypothesis is that the heating is quasi-steady and highly-stratified, i.e., ``footpoint heating''; such heating can drive thermal non-equilibrium in some structures depending on the scale height and magnitude of the energy deposition, and geometry of the structure. For this work, we use one-dimensional models and examine a range of heating parameters, as well as consider the abundances of the plasma and geometries of the loops. For each set of parameters, we determine the range of time delays expected. We define the region of parameter space where we could potentially achieve these long time delays.