Understanding Coronal Heating with Emission Measure Distributions

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It is widely believed that the cross-field spatial scale of coronal heating is small, so that the fundamental plasma structures (loop strands) are spatially unresolved. We therefore must appeal to diagnostic techniques that are not strongly affected by spatial averaging. One valuable observable is the emission measure distribution, EM(T), which indicates how much material is present at each temperature. Using data from the Extreme-ultraviolet Imaging Spectrograph on the Hinode mission, we have determined emission measure distributions in the cores of two active regions. The distributions have power law slopes of approximately 2.4 coolward of the peak. We compare these slopes, as well as the amount of emission measure at very high temperature, with the predictions of a series of models. The models assume impulsive heating (nanoflares) in unresolved strands and take full account of nonequilibrium ionization. A variety of nanoflare properties and initial conditions are considered. We also comment on the selection of spectral lines for upcoming missions like Solar Orbiter.