

## Contribution of small-scale flares to coronal heating estimated by a spectroscopic observation of Hinode.

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The mechanism of coronal heating is one of the long-standing problems in solar physics. Two primary mechanisms have been proposed to explain this problem, namely nanoflares and wave dissipation. In nanoflare model, it is crucial to accurately quantify the contribution of small-scale flares to the coronal heating. So far, spectroscopic observations succeeded in achieving many progress in physics of solar corona. One of the strengths of a spectral observation is capability to derive a line-of-site plasma velocity for each ion species. In this paper, we estimate a contribution of Doppler motion and non-thermal energies released during transient brightenings to the heating of an active region. We use Hinode/EUV Imaging Spectrometer and Solar Dynamics Observatory/Atmospheric Imaging Assembly for the energy estimation and detection of transient brightenings. As a result, the released Doppler motion and non-thermal energies are approximately 1 -- 10% and 10 -- 100% of a change amount of thermal energy in each enhancement, respectively. Using this ratio, we estimate a contribution of the energy flux of AIA transient brightenings as at most 10% of the loss flux.

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