Probing coronal heating with variability of the solar X-ray emission

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If the mechanism responsible for creating hot solar corona is a magnetic one, the resulting coronal heating events are likely to be highly fragmented in space and in time. This makes the nanoflare heating scenario, where both these features are at the heart of the concept, a strong candidate. The major problem is to find out how to test this theory while individual nanoflares remain beyond observational recognition.

Here we discuss a possibility of probing nanoflares with variability of the coronal X-ray emission. We present results of the numerical simulation of X-ray coronal loops that mimics a sporadic nature of the nanoflare heating. The aim is to investigate how an imposed power-law energy spectrum of heating events (nanoflares) translates into fluctuations in the intensity of the X-ray emission, which can be detected observationally as X-ray and EUV brightenings.

These theoretical predictions are compared with a recently reported analysis of observed fluctuations of the solar X-ray emission, and we discuss their implications on the deduced energy and spectrum of nanoflares. A future study, envisaged with the upcoming Solar-B mission, is also discussed.