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Energy Distribution Heating Events Observed During the May 2020 Solar Orbiter Perihelion

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High resolution observations of the solar corona with the EUV telescope onboard the Solar Orbiter mission during the perihelion campaign at 0.56 AU revealed omnipresent impulsive quiet-sun emissions in the 174 Å filter, at previously unresolved temporal/spatial scales. Individual brightenings of the smallest linear size till 0.2 Mm show temporal variability within tens of seconds. These EUV quiet sun brightenings, which have been nicknamed campfires, appear as individual quiet-Sun events or simultaneous / consecutive clusters situated along quiescent loops, where usually steadier emission is expected.

The emission measure varies strongly almost in every pixel during the 260 sec observation time. The thermal energy content of individual impulses is calculated from observed emission enhancements and the derived temperature. EUV telescopes indicate heating events observable in coronal iron lines. The observed energy contents vary in the range $10^{21} - 10^{24}$ ergs, which is in agreement with the lower limit estimation of Parker's nanoflare heating scenario. They occupy a thin vertical layer in the solar corona, as determined by triangulation. The observations suggest that the basic unit of impulsive energy release in EUV corona lies in the range of picoflares, $10^{21} - 10^{24}$ ergs, and may represent a significant part of the missing energy source for coronal heating. Observations were obtained during deep solar minimum, in the absence of any significant flaring activity and active regions.

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