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Stereoscopy of extreme UV quiet Sun brightenings observed by Solar Orbiter/EUI

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We investigate the three-dimensional distribution of the small-scale brightening events (“campfires”) discovered in the EUV quiet Sun by Solar Orbiter/EUI. We use a first commissioning data set acquired by the HRI_EUV telescope of EUI on 2020 May 30 in the 174 Å passband combined with the simultaneous SDO/AIA data taken in the similar 171 Å passband. The spatial resolution of the two telescopes is sufficient to identify the campfires in both datasets. The two spacecraft had an angular separation of around 31.5 degrees, which allowed for the three-dimensional reconstruction of the campfire position. These observations represent the first time that stereoscopy was achieved for brightenings at such a small scale. Manual and automatic triangulation methods were used. The height of campfires is between 1000 km and 5000 km above the photosphere, and we find a good agreement between the manual and automatic methods. The internal structure of campfires is mostly not resolved by AIA, but for a particularly large campfire we were able to triangulate a few pixels, which are all in a narrow range between 2500 and 4500 km. We conclude that the low height of EUI “campfires” suggests that they belong to the previously unresolved fine structure of the transition region and low corona of the quiet Sun. They are probably apexes of small-scale dynamic loops heated internally to coronal temperatures.

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