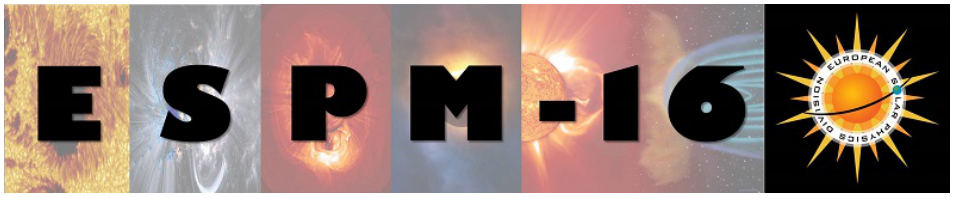

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Prevalence of thermal non-equilibrium over an active region

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The solar corona is characterised by its puzzling multi-million degree component. On the other hand, observations in the last decade have shown that the corona also contains a large amount of coronal rain, 10-100 times cooler and denser than the surroundings. The properties of coronal rain are now known to be strongly linked to the coronal heating properties, but its origin, dynamics, and morphology are still not well understood. In particular, the spatial and temporal occurrence of coronal rain in an active region is unknown. In this study, we carry out an imaging and spectroscopic multi-wavelength statistical study of coronal rain observed in an active region off-limb with IRIS and AIA, spanning chromospheric to transition region temperatures. We use the Rolling Hough Transform (RHT) to automatically detect and measure the properties of coronal rain clumps. Over the 4.5 hr long observation, the entire coronal area in the plane-of-the-sky up to a height of 30-40 Mm is covered by coronal rain, suggesting a prevalence of thermal non-equilibrium (TNE). We estimate the fraction of coronal volume in TNE and the role of coronal rain in the mass and energy cycle. The rain is predominantly at chromospheric, suggesting complete catastrophic cooling, while not much difference is observed in the dynamics over the temperature range. A small subset of loops also exhibit long-period intensity pulsations. We discuss the spatio-temporal properties of the heating linked to this cooling behaviour.

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