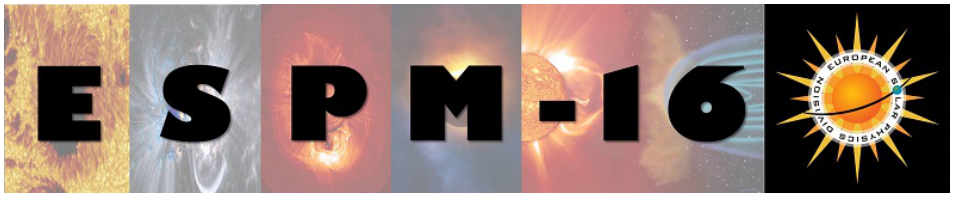

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First Time and Frequency Resolved Imaging Spectroscopy Observations of Solar Radio Spikes

Monday, 6 September 2021 16:35 (13 minutes)

Solar radio spikes are short duration and narrow bandwidth fine structures in dynamic spectra observed from tens of MHz to the GHz range. Their very short duration (10-1000 s) and narrowband emission is indicative of the possibly fastest small-scale energy release processes observed in the solar corona, yet the origin of the spikes is not established. We present, for the first time, spatially, frequency and time resolved observations of individual radio spikes associated with an eruptive solar flare-CME event using the LOw Frequency ARray (LOFAR). The spikes present low frequency drift rates, yet imaging spectroscopy of individual spikes between 30-45 MHz show apparent superluminal spike source motions. Comparison of spike characteristics with that of individual Type IIIb striae show similarities in duration, bandwidth, drift rate, and apparent areal increase, as well as the apparent motion in the image plane. The observed spatial, spectral, and temporal properties of the spike bursts are consistent with plasma radio emission escaping through anisotropic scattering density turbulence that induces the shift in the apparent source location over time.

Primary author: CLARKSON, Daniel (University of Glasgow)

Co-authors: KONTAR, Eduard (University of Glasgow); Dr GORDOVSKYY, Mykola (University of Manchester); Dr CHRYSAPHI, Nicolina (LESIA, Observatoire de Paris); Dr VILMER, Nicole (LESIA, Observatoire de Paris, Universit´e PSL, CNRS, Sorbonne Universit´e, Universit´e deParis, France)

Presenter: CLARKSON, Daniel (University of Glasgow)

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