

Spatial and frequency structure of solar LOFAR radio sources

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We investigate frequency-position structure of radio sources in solar type III and type IV bursts in the frequency range 30-50 MHz observed by LOFAR. These sources are produced by fundamental and harmonic plasma emission induced by propagating suprathermal electrons. Therefore, the frequency is a proxy for the electron density in the emitting plasma, and these observations can be used to estimate the plasma density in the outer corona.

Our analysis indicates that coronal plasma, which produces the emission, is denser and has larger hydrodynamic scale height (i.e. it is less stratified or more uniform) compared to Newkirk's density model. We interpret this as the result of local plasma gradients induced by plasma motion in the corona above solar active regions.