



Fine structures of type III radio bursts observed by LOFAR

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On August 25, 2014, NOAA AR 2146 produced the M2.0 class flare (peaked at 15:11 UT). The flare was associated with a coronal dimming, a EUV wave, a halo CME and a radio event observed by LOFAR (the LOw-Frequency Array). The radio event consisted of a type II, type III and type IV radio emissions.

In this study, we focus on LOFAR observations of the type III bursts, generally considered to be radio signatures of fast electron beams propagating along open or quasi open field lines.

The group of type III bursts was, as usually, observed during the impulsive phase of the flare. At first hand, type III bursts show no peculiarity, but the high frequency/time resolution LOFAR observations reveal that only few of these type III bursts have a smooth emission profile. The majority of bursts is strongly fragmented. Some show a structuring similar to type IIIb bursts, but on a smaller frequency scale, and others show a non-organized patchy structure which gives indication on the possibly related turbulence processes.

Although fine structures of type III bursts were already reported, the wealth of fine structures, and the fragmentation of the radio emission observed in this August 25 event is unprecedented. We show that these LOFAR observations bring completely new insight and pose a new challenge for the physics of the acceleration of electron beams and associated emission processes.