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Dense Forests of Microshots in Fast Radio Bursts

Monday, 15 May 2023 16:00 (15 minutes)

Fast Radio Bursts are millisecond duration, extragalactic, coherent flashes of radio emission. Some repeating fast radio bursts are exceptionally more active than others. FRB 20220912A was discovered in the last quarter of 2022 as it entered an intense active period. During this time, we detected many bursts as part of our repeating FRB monitoring campaign on the Nançay Radio Telescope, ECLAT (Extragalactic Coherent Light from Astrophysical Transients). I will introduce ECLAT and report on some exceptionally bright bursts detected from FRB 20220912A. These detections are further enhanced by the excellent time resolution (16 μs), bandwidth (512 MHz) and dynamic range (32 bit) of the NRT data. Additionally we have overlapping raw-voltage observations for some bursts making use of the Westerbork RT-1 25-m dish, enabling us to probe time and frequency scales every further, down to the Nyquist limit. We see dense forests of clustered microshots in the bursts (~ 16 μs) that are extremely bright (occasionally exceeding a S/N of 1000). After correcting for the dispersion measure, an additional residual drift is present in wider sub-burst components. We propose that the emission mechanism that causes the bright microshots is potentially different from the one responsible for the wider components, phenomenologically analogous to different types of solar radio bursts and potentially caused by a magnetar flare.

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