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## A LOFAR high time resolution search for radio bursts from SGR 1935+2154

ATel #13707; *Cees Bassa (ASTRON), Jason Hessels (ASTRON/UvA), Vlad Kondratiev (ASTRON), Daniele Michilli (McGill), Ziggy Pleunis (McGill), Alex Cooper (UvA), Kelly Gourdji (UvA), Antonia Rowlinson (ASTRON/UvA), Ralph Wijers (UvA)*

on 4 May 2020; 09:20 UT

Credential Certification: *Cees Bassa (cbassa@gmail.com)*

Subjects: Radio, Soft Gamma-ray Repeater, Fast Radio Burst, Magnetar

Referred to by ATel #: [13713](#), [13769](#), [13816](#)

We report on a non-detection of radio bursts from the soft gamma-ray repeater SGR 1935+2154 with LOFAR. These LOFAR observations had the goals of i. studying the detailed morphology of the radio bursts in order to potentially compare with the characteristic time-frequency structure seen in repeating FRBs (Hessels et al. 2019) and ii. studying interstellar scattering along this line of sight. SGR 1935+2154 was observed for 2 hours starting 2020 April 30, 03:30UTC using a tied-array beam from the 24 LOFAR High-Band Antenna (HBA) core stations. Complex voltages were recorded from observing frequencies between 110 to 180 MHz, and coherently dedispersed to the known dispersion measure ( $DM=332.8$  pc/cc) of the burst detected by Scholz et al. (2020, ATel #13681) and Bochenek et al. (2020, ATel #13684). Scholz et al. (2020, ATel #13681) find sub-burst widths of  $\sim 5$  ms with  $\sim 5$ -10 ms of scattering at 400 MHz. At 150 MHz, we thus expect  $\sim 250$ -500 ms of scattering. Therefore, the resulting dynamic spectra were searched for bursts between DMs of 325 to 375 pc/cc with widths in the range of 0.65 to 900 ms. No bursts were seen down to a fluence of 37 Jy ms for a 20-ms burst at  $S/N\sim 7$  and 199 Jy ms for a 200-ms burst at  $S/N\sim 12$ . A simultaneous tied-array beam was pointed towards the millisecond pulsar B1937+21, offset by 1.3 degrees from SGR 1935+2154. The analysis pipeline detected several dozen giant pulses from PSR B1937+21. Analysis of LOFAR imaging observations obtained on 2020 April 29 is ongoing.

*Singe pulse plots*

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