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Bright burst detections from FRB 20220912A at 332 MHz using the Westerbork-RT1 25-m telescope

ATel #15817; *O. S. Ould-Boukattine (ASTRON, UvA), W. Herrmann (Astropeiler Stockert e. V.), M. Gawronski (NCU, Torun), A. Gopinath (UvA), J. W.T. Hessels (UvA, ASTRON), E. F. Keane (TCD), R. Blaauw (ASTRON), J. J. Sluman (ASTRON), H. Mulder (ASTRON), D. J. McKenna (DIAS, TCD), M. P. Snelders (ASTRON, UvA), F. Kirsten (Chalmers), K. Nimmo (MIT)*

on 20 Dec 2022; 15:11 UT

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Subjects: Radio, Fast Radio Burst

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We report the detections of bright fast radio bursts from FRB 20220912A using the Westerbork-RT1 25-m telescope at 332 MHz.

After the discovery of the highly active repeater FRB 20220912A by CHIME/FRB (ATel #15679), we started a high-cadence monitoring campaign using 25-m and 32-m class European radio telescopes. We have been observing the source almost daily at C-, L-, and P-band using the Stockert (Germany), Westerbork (Netherlands) and Torun (Poland) radio telescopes. Depending on availability of the telescopes we observe simultaneously at complementary wavelengths. Additionally we have had overlapping coverage with the LOFAR Core stations in the Netherlands and the international IE613 LOFAR station in Ireland.

Here we report the discovery of four bright bursts detected during 156 h of observing at P-band. Observations were conducted at a central frequency of 332 MHz with a bandwidth of 64 MHz using the Westerbork RT-1 radio telescope. We have a significant drop in sensitivity in the top 8 MHz and therefore mask these channels. The receiver has a system equivalent flux density (SEFD) of 2100 Jy.

The properties of the detected bursts are:

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Burst 1:

Fluence: 426 +/- 86 Jy ms

Arrival time (MJD, TDB): 59905.8871460520

Burst 2:

Fluence: 176 +/- 35 Jy ms

Arrival time (MJD, TDB): 59911.8835634820

Burst 3:

Fluence: 438 +/- 88 Jy ms

Arrival time (MJD, TDB): 59912.9809171292

Burst 4:

Fluence: 892 +/- 179 Jy ms

Arrival time (MJD, TDB): 59922.8202534060

The arrival time is referenced to infinite frequency at the solar system barycentre (in TDB) using a dispersion measure (DM) of 219.46 pc cm⁻³, as determined by CHIME/FRB in the discovery ATel (#15679), and DM constant of 1/2.41e-4 MHz² pc⁻¹ cm³ s.

Each of the four detected bursts had overlap with a subset of the following observations, where we found no counterparts: 151 MHz (VHF-band, IE613 LOFAR station), 1.37 GHz (L-band, Stockert), 1.41 GHz (L-band, Torun) and 4.6 GHz (C-band, Torun). We can place an upper limit on the fluence assuming an 8-sigma 1-ms detection threshold of 30 Jy ms, 7 Jy ms, 14 Jy ms and 11 Jy ms, respectively.

During our campaign we have also detected many tens of bursts at 1.4 GHz (L-band) ranging between 10-1000 Jy ms while no bursts were found at 4.6 GHz (C-band) in hundreds of observing hours, see also ATel #15727. The analysis of all detected bursts, in both L- and P-band, are currently in preparation as part of a forthcoming paper.

Dynamic spectrum of the brightest burst (Burst 4)

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