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The First Observations of Type I and III Radio Bursts with LOFAR Station in Bałdy

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The LOw-Frequency ARray (LOFAR) telescope is a radio interferometer, arranged in 51 stations across Europe. The LOFAR maximum baseline in the N – S direction is 1294 km (between the Onsala – Nançay stations) and in the E – W is 1887 km (between the Bałdy – Birr stations). The telescope operates in the frequency range 10 to 240 MHz. Each station consists of two antenna fields: (i) LBA (Low Band Antennas) antennas, operating in frequency range of 10 – 90 MHz and (ii) HBA (High Band Antennas) antennas operating in frequency range of 110 – 250 MHz. Details about construction and operating the LOFAR telescope can be found in [2].

Solar observations are one of the observational campaigns carried out at the Bałdy station [1]. Here, we focus on observations taken from February up to July 2017. The observations are taken mainly from Friday to Sunday because the remaining time is reserved for operation within International LOFAR Telescope mode.

From February up to July 2017 we observed radio events like type I and III bursts. They occurred on 22 January 2017, 14, 16 and 21 July 2017 (see example on the Figure 1).

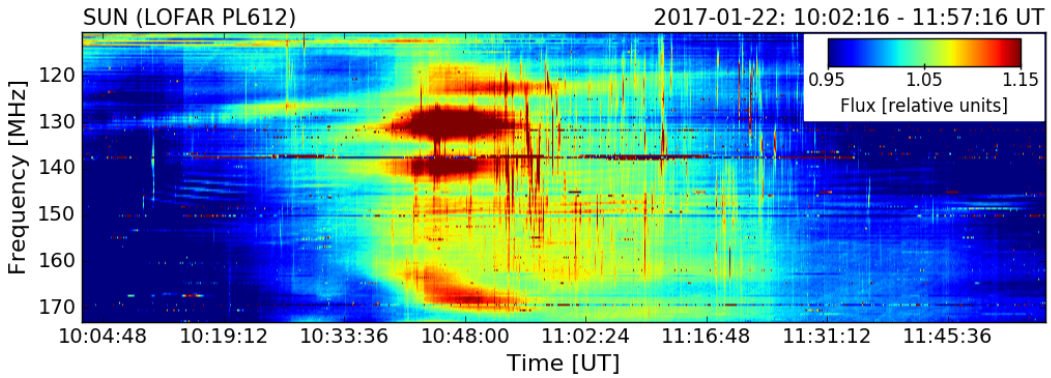

Figure 1. Solar dynamic spectrum of the type I noise storm recorded on 22 January 2017 with LOFAR Bałdy station. The four red areas on the spectrum are probably caused by reflection from the station's computer container. It appeared that day because the sun at noon was very low, about 13 degrees above the horizon. Other explanations of these red areas are also discussed.

The solar observations taken from February up to July 2017 with Bałdy station show that LOFAR is a very promising instrument for radio research at low frequencies and in a near future we can expect interesting scientific results.

References

[1] B. P. Dąbrowski, A. Krankowski, L. Błaszkiewicz, and H. Rothkaehl, "Prospects for Solar and Space Weather Research with Polish Part of the LOFAR Telescope," *Acta Geophys.*, **64**, 2016, pp. 825–840.

[2] M. P. van Haarlem *et al.*, "LOFAR: The LOw-Frequency ARray," *Astronomy & Astrophysics*, **556**, 2013, p. A2.