

# Solar Radio Spectrometer CALLISTO in Hurbanovo - first results

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**Abstract.** A solar radio spectrometer CALLISTO was installed in December 2011 in the Slovak Central Observatory in Hurbanovo in the frame of the ISWI (International Space Weather Initiative) program. The spectrometer registers solar radio radiation using a broadband antenna in the range of frequencies from 45 to 870 MHz. This contribution presents the observing site of the instrument and the first results.

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## Introduction

CALLISTO is an acronym for extended Compact Astronomical Low-cost Low-frequency Instrument for Spectroscopy and Transportable Observatory. CALLISTO was designed by Christian Monstein (ETH Zürich, Switzerland) as a new concept of radio spectrometers to observe solar radio activity (Benz, Monstein, and Meyer, 2005). Further details and examples of dynamic spectra can be found e.g. in Zucca et al. (2012). The international network of more than 70 spectrometers installed up to 2013 at more than 30 sites is called e-CALLISTO. Additional information on e-CALLISTO network and CALLISTO can be found at:

<http://www.e-callisto.org/> or  
<http://www.reeve.com/Solar/e-CALLISTO/e-callisto.htm>.

## CALLISTO in Hurbanovo

CALLISTO eC50 (Figure 1) was installed in the Slovak Central Observatory in Hurbanovo [N 47° 52' 33."28, E 18° 11' 37."93] on 17 December 2011. The instrument receives solar radio signal by using a log-periodic antenna CLP-5130-2N (Figure 2) and a low-noise amplifier ZX60-33LN+ (Figure 1).

## Software installation and first light observation

All necessary software for recording the solar radio spectroheligrams of 15 minutes length and their uploading to the server at ETH in Zürich (Switzerland) was pre-installed before the visit of C. Monstein in Hurbanovo. The instrument was set up on 17 December 2012, the software installation was checked (Figures 3 and 4), and right at the same day a small radio burst was observed as a first light observation.

Plots related to radio frequency interference, CALLISTO coverage in Hurbanovo, and lightcurves at 5 selected frequencies, respectively, are presented in Figures 5 – 7.



Figure 1: CALLISTO instrument No. eC50 (left) with the amplifier ZX60-33LN+.



Figure 2: A log-periodic antenna CLP-5130-2N for the CALLISTO in Hurbanovo.



Figure 3: Ckecking the software installation (I. Dorotovič).

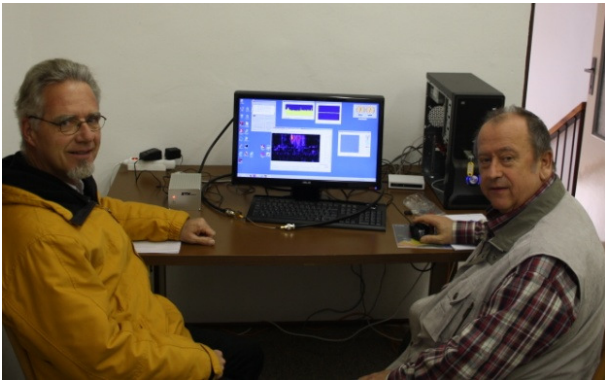


Figure 4: Ch. Monstein (left) and T. Pintér after the first light observation.

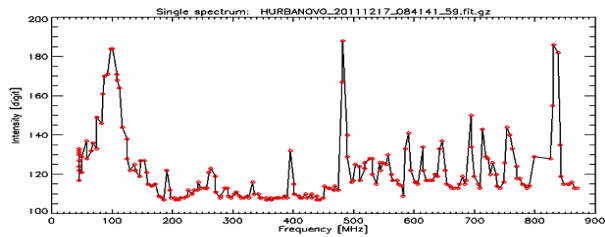


Figure 5: Radio frequency interference (RFI).

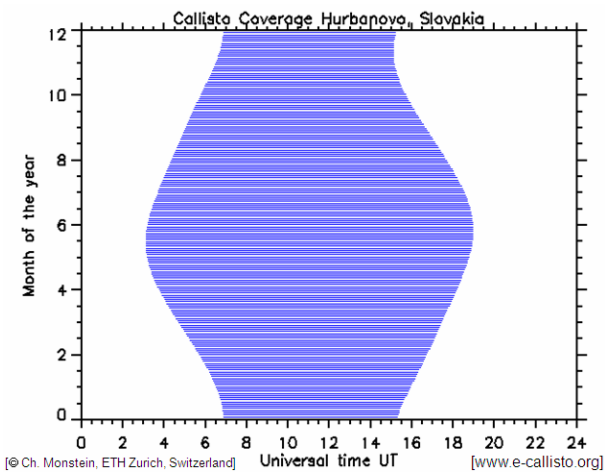


Figure 6: CALLISTO coverage in Hurbanovo.

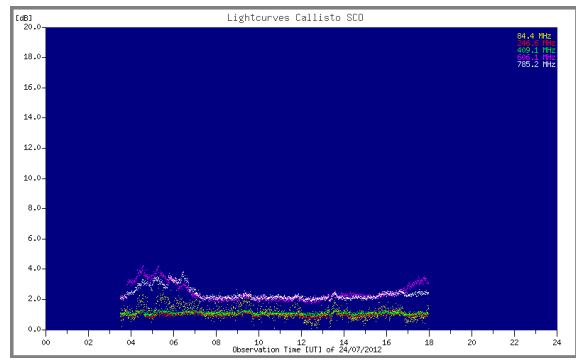


Figure 7: Lightcurves - SCO Hurbanovo.

**Some selected events**

We observed many solar radio burst during the first year of operational use of CALLISTO in Huranovo. Here we selected only two type III burst as a sample events (Figure 9 and Figure 10).

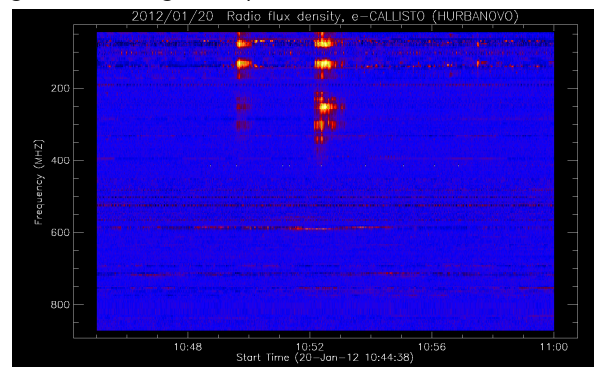
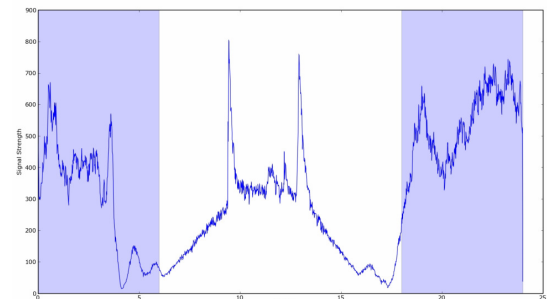
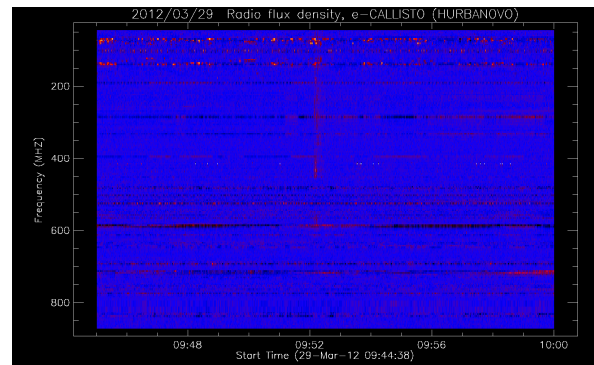


Figure 9: Radio bursts of type III (electrons) on 20 January 2012 between 10:49 and 10:53 UT.



29 March 2012

Figure 10: Radio burst of type III (electrons) on 29 March 2012 at 9:52 UT (top panel) and the SuperSID monitor record from the same day.

## Future plans

We will install the antenna on a stable stand and we will use rotator for the antenna for better sensitivity during morning and evening events. A tracking controller has been designed and manufactured for automatic tracking of the antenna during an observing day.

## Acknowledgments

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## References

- Benz, A.O., Monstein, C., Meyer, H.: 2005, *Solar Physics*, 226, 143-151, doi: 10.1007/s11207-005-5688-9.
- Zucca, P., Carley, E. P., McCauley, J., Gallagher, P. T., Monstein, C., McAteer, R. T. J.: 2012, *Solar Physics*, 280, 591-602, doi: 10.1007/s11207-012-9992-x.