

The optical ^{88}Sr lattice clocks and stabilized fibre links: a frequency reference for the VLBI system

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On 26th Nov. 2015 Toruń Radio Astronomy Observatory (based in Piwnice near Toruń), a part of the Centre for Astronomy of N. Copernicus Univ., Toruń (Poland) was connected to Polish fibre optic network distributing time and frequency (T&F) signals from UTC(PL) and UTC(AOS) laboratories. This paves the way for investigation of alternative methods of T&F synchronization during Very Long Baseline Interferometry (VLBI) observations.

Typically, T&F signals for VLBI observations are provided by the local standard, usually H-maser. Here, we report how the fibre network allows remote synchronizing the station with optical strontium lattice clocks [1][2] operated in National Laboratory of Atomic, Molecular and Optical Physics (KL FAMO) in Toruń and with both Polish UTC laboratories [3]. Additionally, the local H-maser may be disciplined by these two remote sources.

We conducted a proof-of-concept experiment on 15 March 2016 during the test time preceding a regular e-VLBI session of the European VLBI Network (EVN). Besides the Toruń VLBI station, the participating telescopes included Effelsberg (DE), Medicina (IT), and Yebes (ES). We have successfully proved that the remote optical atomic clock can provide the operational synchronization of radio telescopes during VLBI observations.

References

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