4 Time Transfer session

Chairs: U. Schreiber, J.M. Torre

4.1 All Optical Time and Frequency Distribution for Space Geodesy

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The demands of GGOS are a high for a modern system for the distribution of time and frequency on a geodetic fundamental station. Variable delays within the main techniques of space geodesy, namely SLR, VLBI, GNSS and DORIS are limiting the stability of the measurements. This leads to the rather paradox situation, that each technique has to adjust the clock offsets independently. Although all main measurements systems on an observatory are usually based on the same clock, each technique provides different offsets. This reflects the fact that the clock adjustments are also contaminated with (variable) system specific delays. Furthermore on closer investigations one finds, that the overall time synchronization across the Geodetic Observatory Wettzell for example is of the order of 5 nsec in the long-term.
We have designed an all optical time and frequency system based on the “Einstein Synchronization Procedure” that allows a synchronization accuracy of 1 ps for all the distributed systems across the campus. Therefore it will be possible to reference all measurements to the same time scale at every measurement system and more importantly to control the system delays to the same level of accuracy. This opens the door to accurate closure measurements of system delays within each measurement technique and from one technique to the next (e.g. from SLR to VLBI). Furthermore this also means that optical time transfer to satellites is no longer limited by the system delays on the ground. This talk outlines the physical properties of the new time and frequency distribution system and emphasizes its importance for inter- and intra- technique co-location measurements.