Master project at Geodetic Observatory Wettzell

Stability analyses of optical timing system at the Geodetic Observatory Wettzell

Project description/Projektbeschreibung:
Geodetic measurement systems, like radio telescopes or laser ranging systems, require a stable and accurate time reference. In cooperation with Menlo Systems GmbH, a unique 2-way optical fiber time and frequency distribution system was designed at the Geodetic Observatory Wettzell. It makes time and frequency from a central station master clock, which is the physical representation of Coordinated Universal Time (UTC), available at different locations of the observatory. A mode-locked femtosecond laser pulse train is fed into an active delay stabilization unit and an optical timing link which brings the signal from the master clock to each individual observation technique at the GO Wettzell. A total of 10 timing links with their so-called back-ends are already in operation and 3 links are in development and will be installed soon. The back-end forms an interface between optical timing distribution and geodetic measurements systems. Each of the back-end provides reference frequencies (5, 10 and 100 MHz) and time markers defined as one pulse per second (1PPS). In addition, an output of ultrashort optical pulses is used for time distribution. In space geodesy it is of high importance to time tag the measurements with respect to a master clock. Therefore one of the 13 back-ends is specifically designed for calibration purposes and for stability tests of other back-ends.

Aims of the project/Projektziele:
The aim of this thesis is to investigate and analyze the basic parameters of each back-end. The phase noise of the reference frequency, timing delays. The work includes stability tests with respect to the station master clock and the determination of optimal optical power levels which are required to generate timing signals.
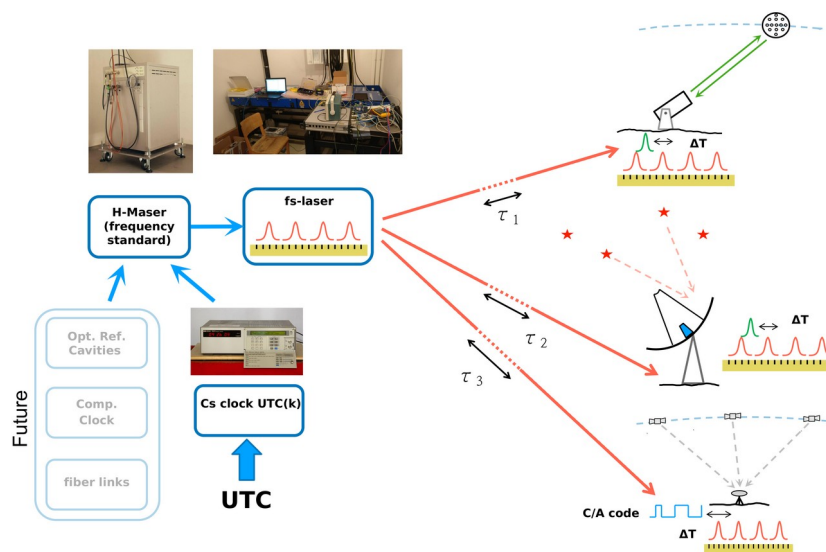
Skills/Kenntnisse:
This project will properly suit students who like practical work. Basic knowledge in programming (Matlab or similar), knowledge in data processing and physics or electrical engineering is required.

Questions are appreciated! Please ask:

Contact/Kontakt: Jan Kodet, 09941/603-118, jan.kodet@tum.de
                Eva Schroth, 09941/603-109, eva.schroth@bkg.bund.de

Hinweis:
Dieser Projektvorschlag wird in Englisch veröffentlicht, um deutsche und internaltionale Studierende anzusprechen. Die Arbeit kann, wenn die Bedingungen der Prüfungsordnung es zu lassen, in Deutsch oder Englisch verfasst werden. Auch am Observatorium wird hauptsächlich deutsch gesprochen.