NEAT-FT: The European Fiber Link Collaboration

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The development of clocks based on optical transitions during the past three decades culminates in the availability of optical clocks with unprecedented stability and uncertainty[1]. Simultaneously, increasing requirements for accurate time and frequency signals, e.g. for tests of fundamental physics or novel applications in relativistic geodesy, put forward new challenges. Typically, such applications rely on the comparison of two remote clocks. Thus, major challenges are how to synchronize these clocks over long distances or how to get the time or frequency signal of a clock to the location where it is required.

It is generally agreed that optical fiber links are an excellent alternative to established satellite based distant clock comparison and synchronization techniques. A European joint research project called **N**etwork for **E**uropean **A**ccurate **T**ime and **F**requency **T**ransfer (NEAT-FT)[2] has been initiated in 2011 to lay the foundations for a novel approach to disseminate high-precision timing and ultrastable frequency signals by using existing fiber infrastructure. Since Europe has a large number of modern ultra-precise clocks, special emphasis is put on the development of new techniques for time transfer and phase-coherent comparison of remotely located optical clocks and the feasibility of a European fibre network connecting optical clocks in Europe.

This talk highlights recent achievements and discusses some applications and prospects.

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[1] B. J. Bloom, T. L. Nicholson, J. R. Williams, S. L. Campbell, M. Bishof, X. Zhang, W. Zhang, S. L. Bromley and J. Ye, "An Optical Lattice Clock with Accuracy and Stability at the 10^{-18} Level", *Nature* **506**, 71–75 (2014)

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