TG Optical Clock Networks Overview

TG Leader	Gesine Grosche

TG Activities

- Optical clocks:
  - Bring the inaccuracy and instability stationary optical clocks below the level of 1 part in 10^{18}
  - Bring today's optical clocks from prototype status to more reliable, rugged, transportable and miniaturized devices
  - Investigate compound clocks
  - Improve transportable Sr clock
  - Test new Al^+ logic clock
- Frequency Transfer:
  - Consolidate inaccuracy and instability of interferometric fibre links in the $10^{-19}$to 10^{-20} regime
  - Investigate link non-reciprocality and relativistic effects
  - Investigate coherent free-space frequency transfer
- CRC 1464 TerraQ:
  - Establish chronometric levelling with cm resolution as routine tool for geodesy
  - Transfer lab-based link performance to robust in-field systems
  - Identify locations and applications for chronometric levelling
- Other:
  - Coordinate measurement campaigns and results
  - Investigate new network schemes

TG Competences/Services

- Grosche: Frequency transfer techniques
- Lisdat: Stationary and transportable Sr optical lattice clocks
- Schmidt: Transportable Al^+ clocks
- Müller: Relativistic geodesy
- Lämmerzahl: Relativistic geodesy

Involved QF Members

Members	Institution	Relevant Expertise
Gesine Grosche, leader	PTB	Free-Space Frequency Transfer; Frequency Transfer Techniques
Alexander Kuhl	PTB	Free-Space Frequency Transfer
Thomas Waterholter	PTB	Frequency Transfer Techniques
Christian Lisdat	PTB	Sr Optical Lattice Clock
Chetan Vishwakarma	PTB	Sr Optical Lattice Clock
Jürgen Müller	LUH	Relativistic Geodesy; LLR Relativity Test; Application of Quantum Gravimetry
Hu Wu	LUH	Relativistic Geodesy
Piet Schmidt	PTB / LUH	Quantum Logic Spectroscopy of Highly Charged Ions; Transportable Al+ Clock
Stefan Hannig	PTB	Transportable Al+ Clock
Claus Lämmerzahl	ZARM	Quantum Sensors in Free Fall; Relativistic Geodesy; Quantum Objects in Gravity
Steffen Sauer	LUH	Ultra-stable cavities for optical clocks
Tara C. Liebisch	PTB	Clock Network Schemes
Ernst Rasel	LUH	Quantum Gravimeters; Atom-Chip Based Gravimeters and Inertial Sensors
Stefanie Kroker	PTB / LUH	Complex Coupled High Index Waveguide Arrays; Photonic Nanomaterials in the Strong Optomechanical Coupling Regime
Dennis Philipp	ZARM	General Relativity, relativistic geodesy
Eva Hackmann	ZARM	General Relativity, relativistic geodesy
Steffen Schön	IfE	GNSS Frequency Transfer
Sebastian Koke	PTB	Frequency Transfer Techniques
Jingxian Ji	PTB	Free-Space Frequency Transfer
Jaffar Kadum	PTB	Frequency Transfer, Fibre Brillouin Amplifiers