

## TG Laser Development and Stabilisation for next-generation GWDs Overview

<b>TG Leader</b>	Benno Willke
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### TG Activities

Scaling concepts for single-frequency fibre amplifiers at 1064 nm, 1550 nm and 2000 nm

- design, fabricate and test all fibre amplifier concepts
- optimise the free-running noise performance of the lasers
- develop hybrid laser systems based on Nd:YVO solid-state pre-amplifiers followed by high power fiber amplifiers
- tested hybrid systems and compared to sequential Nd:YVO amplifier chains.
- coherent combination

Laser stabilisation for 3rd generation gravitational wave detectors

- shot-noise-limited sensing of the relevant laser observables
- analyse and mitigate the influence of scattered light in sensing schemes
- develop laser stabilisation schemes with high bandwidth fibre actuators
- usage of squeezing and AC coupling to laser stabilisation
- laser stabilization at 1550nm, evaluate synergies of combined stabilization/squeezing setup
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### TG Competences/Services

- high power lasers
- laser stabilization
- shot noise limited sensing

### Involved QF Members

Members	Institution	Relevant Expertise
Benno Willke, Leader	AEI	Squeezed Light Sources; Advanced Light Sources
Marina Trad Nery	AEI	Advanced Light Sources Quantum limited laser stabilization
Dietmar Kracht	LZH	Advanced Light Sources; Precision Additive Manufacturing of Quantum Sensors; High power solid-state single frequency amplifiers
Sergii Iakushev	LZH	Advanced Light Sources
Merle Schneewind	LZH	Advanced Light Sources
Fabian Meylahn	AEI	Advanced Light Sources Quantum limited laser stabilization Squeezed Light
Nina Bode	AEI	Advanced Light Sources Quantum limited laser stabilization

Jasper Venneberg	AEI	Quantum limited laser stabilization Sqzeezed Light
Joscha Heinze	AEI	uantum limited laser stabilization Sqzeezed Light
Nicole Knust	AEI	Advanced Light Sources Quantum limited laser stabilization Sqzeezed Light
Philip Booker	LZH	Advanced Light Sources
Sven Hochheim	LZH	Advanced Light Sources
Felix Wellmann	LZH	Advanced Light Sources
Peter Weißels	LZH	Advanced Light Sources
Michael Steinke	LUH	active optical fibers and fiber components
Stefanie Kroker	PTB / TUBS	ET Analyse
Uwe Sterr	PTB	Novel Frequency References
Ernst Rasel	LUH	Quantum Gravimeters; Atom-Chip Based Gravimeters and Inertial Sensors
Harald Lück	AEI	Next Generation Gravitational Wave Observatories; Sub-Standard Quantum Limit Interferometry
Henning Vahlbruch	AEI	Non-classical light sources
Eike Brockmüller	LZH	
Kristopher Kruska	LZH	