

## TG Backaction-Evading Techniques Overview

<b>TG Leader</b>	Michèle Heurs
------------------	---------------

Investigation of techniques (theory and experiment) to avoid limiting measurement back-action in precision metrology, e.g. in quantum optomechanics

### TG Activities

- all-optical quantum radiation pressure noise reduction (Coherent Quantum Noise Cancellation)
- Laser power stabilisation via radiation pressure
- Investigation of membrane-in-the-middle (MiM) / membrane-at-the-edge (MatE) optical resonators for quantum optomechanical experiments (at RT and cryogenic)
- Testing of micro-optomechanical oscillators for cavity experiments near and below the SQL (collaboration with TG “Novel micro-optomechanical oscillators”)

### TG Competences/Services

- (polarisation-non-degenerate, two-mode) high-frequency squeezed light sources at 1064 nm
- high-frequency, large-bandwidth, low noise photodetection (single and homodyne)
- q.o. theory
- Optical and multi-physics simulations and design
- various optical and mechanical characterisation

### Involved QF Members

<b>Members</b>	<b>Institution</b>	<b>Relevant Expertise</b>
Michèle Heurs, Leader	AEI / LUH	Backaction-Evading Techniques; Quantum Optomechanics
TBD	AEI	Backaction-Evading Techniques
Roman Kossak	AEI / LUH	Optomechanically coupled resonators and interferometers in cryogenic environments
Karsten Danzmann	AEI / LUH	Experimental Quantum Opto-Mechanics
Benno Willke	AEI	Squeezed Light Sources; Advanced Light Sources
Marina Trad Nery	AEI / LUH	Backaction-Evading Techniques
Klemens Hammerer	LUH	Backaction-Evading Techniques; Quantum Optomechanics
Mariia Matushechkina	AEI	Backaction-evading techniques; Scattering processes in metamaterial structure; Optical simulations
Bernd Schulte	AEI	optomechanical experiments at cryogenic temperatures
Jonas Junker	AEI	squeezed light sources; backaction-evading techniques



Dennis Wilken	AEI	squeezed light sources; backaction-evading techniques; photodetection
Harald Lück	AEI / LUH	Sub-SQL interferometry; Next Generation Gravitational Wave Observatories
David Wu	AEI	Sub-SQL interferometry
Sean Leavey	AEI	Sub-SQL interferometry
Robin Kirchhoff	AEI	seismic isolation
Janis Wöhler	AEI	thermal noise interferometer
Matteo Carlassara	AEI	Commissioning of the SQL Interferometer
Jian Liu	AEI	Sub-Standard Quantum Limit Interferometry
Johannes Lehmann	AEI	mirror suspensions
Christian Vogt	ZARM	Quantum optomechanics
Julian von Wrangel	AEI	fibre welding, bonding
Nived Johny	AEI	Optomechanical experiments at cryogenic temperature
Sara Al Kershi	AEI	
Luise Kranzhoff	AEI	