



Deutsche Forschungsgemeinschaft  
Peter the Great St. Petersburg Polytechnic University

## Quantum Metrology at the Quantum Frontiers

DFG Leibniz Lecture  
by

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**20 April 2018, 10:30 am**  
Peter the Great St. Petersburg Polytechnic University, NIK,  
Politechnicheskaya 29, bld. 11, Saint Petersburg

The lecture will be followed by a reception by the DFG

Online registration is obligatory:  
[www.deutsche-woche.ru](http://www.deutsche-woche.ru)



### About the lecture

Highly sensitive quantum sensors based on ultra-cold atomic ensembles open new horizons in quantum sensing and quantum metrology. For instance, inertial sensing by atom interferometry or optical atomic clocks benefit strongly from new methods of quantum engineering of the atomic ensembles.

Entanglement, one of the most intriguing features of quantum mechanics, is nowadays a valuable resource for the improved sensitivity of quantum metrology beyond the standard quantum noise limit. Most prominently, quadrature-squeezed and spin-squeezed states are and will be new techniques propelling atom interferometry and atomic clocks to sub-shot-noise performance. Eventually, this will pave the way towards “interaction-free” quantum measurements.

This lecture treats – besides introductory examples – innovative applications and research directions based on these developments and recent breakthroughs. This will include relativistic geodesy, pan-European clock comparisons, fundamental tests in weightlessness and on ground.