

**Deutsche Forschungsgemeinschaft  
Faculty of Physics, Lomonosov Moscow State University  
Russian Science Foundation**

## **Invitation to the DFG Leibniz Lecture**

**Professor Dr Wolfgang Ertmer**  
Institute of Quantum Optics  
Leibniz Universität Hannover  
Vice President of the DFG

### **COLD ATOM BASED QUANTUM METROLOGY**

21 February 2017, 5.00 pm

Faculty of Physics, Lomonosov Moscow State University  
Leninskie Gory, bldg 1, str. 2, Moscow, 119991

**Online registration is obligatory until 20 February 2017:**  
<https://lomonosov-msu.ru/rus/event/4130/>

The lecture will be followed by a reception by the Deutsche Forschungsgemeinschaft (DFG).

#### **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.

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