



CRC 1227  
Designed Quantum States of Matter



## GUEST LECTURE

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University of Innsbruck  
Institute for Theoretical Physics, Austria  
(Guest of Prof. Dr. Piet O. Schmidt)

Leibniz Universität Hannover  
Welfengarten 1, 30167 Hannover  
(building 1101)  
Seminar room D326  
at the Institute of Quantum Optics  
11 April 2019, 3:30 pm

### **"Macroscopic quantum states: applications and fundamental limitations"**

The creation of ever larger quantum states that are in a coherent superposition is an experimental challenge of fundamental and practical interest. We report on attempts to characterize such superposition states, and on fundamental limitations to prepare, maintain and detect them. This includes general results on fragility of all macroscopic quantum states under noise, and the need of tremendous measurement devices to detect them. We also consider applications of such states in the context of quantum metrology, and show that noise and imperfections limit the achievable quantum advantage. We discuss methods such as dynamical control or quantum error correction that allow one to overcome some of these limitation, and present noise-resilient methods for optimal sensing of non-local quantities using distributed sensors.

All DQ-mat members and all interested  
are cordially invited to attend.