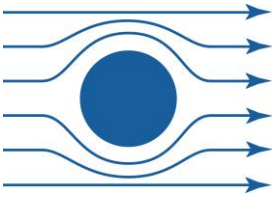

Walther-Meißner-Institut

Bayerische Akademie der Wissenschaften

Walther-Meißner-Seminar

Walther-Meißner-Institut, Seminar Room 143

Date: **Friday, June 10, 2016, 13:30 h**

Speaker: **Prof. Dr. Oriol Romero-Isart**

IQOQI - Institute for Quantum Optics & Quantum Information,
Austrian Academy of Sciences,
Technikerstraße 21a, 6020 Innsbruck, Austria

Title: **Levitated Magnets in the Quantum Regime: New Opportunities**

Abstract:
Several experimental groups are trying to bring and control the center-of-mass of an optically levitated dielectric nanosphere in the quantum regime. In this talk I will discuss and motivate an alternative approach based on magnetic levitation of nano- and micromagnets. In the first part of the talk we will discuss a recent theoretical proposal for an all-magnetic on-chip quantum interferometer scheme capable to prepare large quantum superpositions of a superconducting microsphere with a mass of 10^{13} amu's. As a figure of merit, we show that at such mass and superposition size scales, the faint gravitationally-induced decoherence model proposed by Penrose and Diósi in the 80's could be unambiguously falsified. In the second part of the talk, we will discuss the possibility to magnetically levitate a single magnetic domain nanoparticle. We will show that at such small scales the Einstein-De Haas effect plays a crucial role in the stability of the trap. We will further discuss some on-going work on the possibility to bring the degrees of freedom of the nanomagnet in the quantum regime, namely the center-of-mass, the orientation, and the macrospin degrees of freedom.

gez. R. Gross