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Fakultät für Naturwissenschaften, Fachbereich Physik

Announcement

Seminar Quantum Sensing and Metrology

Description

The general theme of the seminar is "Quantum Sensing and Metrology" and single topics are listed below. They deal with nuclear magnetic resonance imaging, nanoscale quantum effects, decoherence in quantum systems, high frequency measurements, single photon and single charge devices, and applications in metrology.

Because of the special situation in this semester, there will be no meeting at the beginning of the lecture period to distribute the topics. Instead, the students should register for the seminar via the study commission (Gerold Brackenhofer) per email and indicate **two** topics of interest according to the numeration below latest on Sunday 26th April. The topic selection with the higher priority should be given first. The talks will be distributed on a first come first serve basis. The list with talks and tutors will be distributed to the students via email by May 3rd.

Depending on the teaching situation later in the semester, the talks (in English) will be presented either in the second half of the semester or in two block appointments at the end of the lecture time. In addition an elaboration of about 15 pages should be submitted two weeks after the presentation.

Topics:

1. INanoscale NMR
2. Magnetic Resonance Imaging (MRI) in and hyperpolarization enhanced MRI
3. Nuclear magnetic resonance and NMR magnetometry
4. Decoherence and precision limits in sensing and metrology
5. Next-generation single-photon sources and their use for quantum measurements
6. Quantum entanglement in sensing and metrology
7. Diamond magnetometry
8. Frequency combs
9. Optical clocks
10. Single-Charge Transfer Devices and the standard of Ampere
11. Quantum Hall Resistance Standard
12. New definition of the mass unit

Literature

- Textbook chapters
- Review articles
- Original research articles

Additional Information

Seminar: 3 ECTS

Advanced Seminar: 4 ECTS

Lecturer

Dr. Rémi Blinder, Prof. Dr. Fedor Jelezko, Prof. Dr. Peter Reineker