ÖPG Thesis Awards

Wednesday, 06.09.2023, Room 115

Time	ID	ÖPG Thesis Awards *Chair: Benjamin Klebel-Knobloch, TU Wien*
14:30	**71**	**Creating The World's Toughest Obstacle Course for Magnetic Flux Quanta in High-T_c Superconductors** *Bernd Aichner [1], Lucas Backmeister [1], Max Karrer [2], Katja Wurster [2], Philipp A. Korner [1], Christoph Schmid [2], Sandra Keppert [3], Reinhold Kleiner [2], Johannes D. Pedarnig [3], Edward Goldobin [2], Dieter Koelle [2], Wolfgang Lang [1]* *[1] Faculty of Physics, University of Vienna, Austria* *[2] Physikalisches Institut, Center for Quantum Science (CQ) and LISA+, Universität Tübingen, Germany* *[3] Institute of Applied Physics, Johannes Kepler University Linz, Austria* Controlling the movement of magnetic flux quanta in high-temperature superconductors such as $YBa_2Cu_3O_{7-\delta}$ is essential for most applications. It demands the introduction of artificial defect structures that serve as obstacles for the moving flux quanta. Using a helium ion microscope's well-controllable focused beam, we create ultra-dense periodic patterns of hills and hollows in the potential landscape in which the vortices move. This artificial nano-scaled obstacle course for magnetic flux-quanta leads to exciting electronic transport effects, such as commensurability effects, magnetic vortex caging and the emergence of an ordered Bose glass phase. Besides their potential for superconductivity research, these complex pinning landscapes for magnetic flux quanta are an essential step toward low-dissipative superconducting electronics.
15:00	**72**	**Holographic QCD and the Anomalous Magnetic Moment of the Muon** *Josef Leutgeb, TU Wien* The primary source of the estimated error in the standard model's prediction for the anomalous magnetic moment of the muon originates mainly from hadronic vacuum polarization and hadronic light-by-light scattering. The latter is dominated by the exchange of neutral pseudoscalars and axial-vector mesons. By employing holographic QCD, we can compute these contributions and address the problem of most phenomenological models in meeting the established short-distance constraints of the hadronic light-by-light tensor. Notably, this includes the constraint implied by the axial anomaly identified by Melnikov and Vainshtein.
15:30	**73**	**Understanding complex oxide surfaces at the atomic level through ncAFM and DFT** *Igor Sokolović, Institute of Applied Physics and Institute of Microelectronics, TU Wien* Solid oxide compounds constitute the vast majority of all solids on Earth. Their variety is responsible for a wide range of intriguing physical properties, and their abundance opens a possibility for wide-spread technical use. Each solid interacts with the environment through the exposed surfaces, and Surface Science aims to understand these processes and a fundamental level. The structure of a surface can be directly recorded with non-contact atomic force microscopy (ncAFM) with single-atom precision. The observed configurations can be theoretically modeled with quantum mechanics through density functional theory (DFT). In this talk, I will introduce and demonstrate these state-of-the-art Surface Science techniques on a surface of a prototypical TiO_2 oxide.
16:00		***END***
16:30		***Coffee Break***