CRC 1227
Designed Quantum States of Matter

GUEST LECTURE

Dr. Benjamin A. Stickler

University of Duisburg-Essen,
Faculty of Physics, Duisburg, Germany
(Guest of Prof. Dr. Klemens Hammerer)

Leibniz Universität Hannover
DQ-mat Colloquium
02 December 2021, 3.00 pm
(via Zoom-Meeting)

"Testing and Exploiting Macroscopic Quantum Physics"

Controlling the quantum dynamics of massive objects enables novel sensing and metrology schemes as well as high-mass tests of the quantum superposition principle. In this talk, I will discuss how diffraction of chiral molecules can prepare superpositions of molecular configurations [1], how rotational interference of levitated nanoparticles can be exploited for torque sensing [2], and how charged nanoparticles can be entangled with superconducting circuits [3]. These examples demonstrate that the quantum rotations and internal degrees of freedom of large molecules and nanoparticles give rise to new quantum effects which have no analogue in their center-of-mass motion.

[1] B. A. Stickler, M. Diekmann, R. Berger, D. Wang, Phys. Rev. X 11, 031056 (2021).
[2] B. A. Stickler, K. Hornberger, and M. S. Kim, Nat. Rev. Phys. 3, 589 (2021).
[3] L. Martinetz, K. Hornberger, J. Millen, M. S. Kim, and B. A. Stickler, npj Quantum Inf. 6, 101 (2020).

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