



e-conversion



Seminarankündigung

**Freitag, 29. Oktober 2021
14:00 Uhr**

ZNN, Seminarraum EG 0.001

also ONLINE via ZOOM

<https://tum-conf.zoom.us/j/61964321148>

Password: NSOM

“Tip-enhanced strong coupling: Room temperature pico-cavity QED with single emitter”

Optical cavities can enhance and control the light-matter interaction by modifying the local electromagnetic environment of a quantum emitter. However, large cavity mode volumes have prevented strong coupling between dielectric cavities and single emitters under ambient conditions. Here, we developed tip-enhanced strong coupling (TESC) spectroscopy, imaging, and control based on scanning probe microscopy using plasmonic antenna-tips forming a pico-cavity with the emitter. With single quantum dots, defects, and excitons in 2D semiconductors, we demonstrate the transition from Purcell enhancement in weak-coupling to entanglement and polariton mode splitting in strong-coupling. With unprecedented coupling strength of >160 meV and anti-crossing in the energy spectra with detuning we overcome dissipation even at room temperature. In the extension to the infrared we achieve strong coupling of molecular vibrations and quantum wells through configurable optical interactions of a nanotip with an infrared resonant nano antenna with hybridization and mode splitting. We observe nanotip-induced quantum interference of vibrational excitation pathways in spectroscopic nanoimaging as basis for the development of molecular cavity opto-mechanics. Manipulating these interaction in the strong coupling regime opens new pathways from opto-electronic and chemical sensing to quantum information science.

Prof. Markus B. Raschke
Department of Physics and Chemistry
University of Colorado at Boulder/JILA
USA