chemisch
physikalische
gesellschaft

Gegründet im Jahre 1869 von H. Hlasiwetz, J. Loschmidt, J. Petzval und J. Stefan

EINLADUNG

zum Vortrag

von

Sarah M. Skoff, MSc PhD

Atominstitut, Technische Universität Wien

Enhancing light-matter interactions for quantum technologies and sensing applications

am Dienstag, 18. April 2023, um 17:30 Uhr

Ort: Lise-Meitner-Hörsaal, Fakultät für Physik, Universität Wien,
1090 Wien, Strudlhofgasse 4 / Boltzmanngasse 5, 1. Stock

Barrierefreier Zugang: Boltzmanngasse 5, Lift, 1. Stock rechts über den Gang zum Hintereingang des Hörsaals

Abstract

Photons are ideal carriers of information. They are very fast, can be easily manipulated and detected and transported with low loss over vast distances in optical fiber networks. With the advent of quantum technologies, one now seeks to use photons not only as carriers but also to process quantum information. This has sparked the quest for nonlinear interactions at very low signal levels eventually down to single quanta of light.

In my talk, I will give an overview of our approach to enhance the interaction between light and matter by employing solid-state quantum emitters, waveguides, cavities and plasmonics. Our quantum emitters of choice are dye molecules in organic nanocrystals and colour centers in 2D materials, where the latter are particularly interesting due to their remarkable properties even at room temperature. I will show how we can interface these emitters with optical waveguides, which provide a strong transverse confinement of the light field. By employing cavities in addition to such waveguides the light-matter interaction can be further increased, which makes such platforms suitable for various constituents of quantum networks.

Changing gears a bit I will then also show how nanophotonics can be employed for sensing applications. In particular I will demonstrate how plasmonics can aid to image and identify nanoplastic particles which are otherwise extremely challenging to detect. As plastic pollution is an ever growing environmental and health concern, being able to detect such particles is the first step in finding solutions to this problem.