



Institut für
Angewandte Physik



Physikalisches
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RHEINISCHE
FRIEDRICH-WILHELMS-UNI-
VERSITÄT BONN

COLLOQUIUM „OPTICS AND CONDENSED MATTER“

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From (Chiral) Polaritonics to Predicting the Dynamic of Single Photon Emitters in Host Materials

Confining optical or plasmonic modes results in an increase in light-matter coupling and leads either to enhanced emission times (Purcell enhancement) or even to the creation of hybrid light-matter states, called polaritons. Control over the electromagnetic confinement allows, therefore, to non-intrusively control the correlated eigenstates. We begin with a brief overview of our recent developments in ab initio QED that aim to understand the potential impact of polaritonics on chemical reactivity [3-6], aggregation [7], plasmonic catalysis, and chiral recognition [1,2]. We will then discuss possible strategies and payoffs for the design of improved molecular single-photon emitters embedded in host materials. Special attention will be placed on a holistic and atomistic description targeted at providing reliable predictions for ideal guest-host matches that can be suggested using machine learning techniques.

[1] C. Schäfer, D. Baranov, J. Phys. Chem. Lett. 2023, 14, 15, 3777-3784.

[2] D. Baranov, C. Schäfer, M. Gorkunov, ACS Photonics 2023, 10, 8, 2440-2455.

[3] C. Schäfer, Phys. Chem. Lett. 2022, 13, 30, 6905-6911.

[4] C. Schäfer, F. Buchholz, M. Penz, M. Ruggenthaler, and A. Rubio, PNAS 2021 Vol. 118 No. 41 e2110464118.

[5] C. Schäfer, J. Flick, E. Ronca, P. Narang, and A. Rubio, Nature Communications, (2022) 13:7817.

[6] C. Schäfer, J. Fojt, E. Lindgren, and P. Erhart, J. Am. Chem. Soc. 2024, 146, 8, 5402-5413.

[7] M. Castagnola, T. Haugland, E. Ronca, H. Koch, C. Schäfer, J. Phys. Chem. Lett. 2024, 15, 5, 1428-1434.

April 9th, starting with discussion at 17:00 h, talk at 17:15 h, live IAP lecture hall or via Zoom

<https://uni-bonn.zoom.us/j/98441612025?pwd=a01SSjlkY1Q3SDFhL09JQk1qc1V6dz09>

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