Institut für Festkörpertheorie

# Seminar – Sondertermin

Ort: Seminarraum 718 (Wilhelm-Klemm-Straße 10)

Zeit: **Montag, 24.07.2017, 15 c.t.**

# Molecular Quantum Plasmonic Nanoantennas

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Plasmonics research has ushered in a new era of precise control over light in sub-diffraction volumes. In recent years there has been strong interest in exploring the ultimate small size limit of plasmonics with the ambition that, by the manipulation of individual atoms/molecules, the properties of light, such as the local field enhancement, gradient and polarisation, can be controlled on the nano/angstrom scale. This is known as quantum plasmonics [1,2] and could lead to developments in quantum optics, as well as nano-localised photochemistry and the design of efficient molecules for light–matter interaction. There is also interesting fundamental questions still to be addressed with the apparently innocent question 'what is a plasmon in the quantum limit?' still able to provoke heated debate.

In my talk I will discuss some of our recent work on the plasmonic response of single-atom thick atomic chains within the framework of time dependent density functional theory [3]. In particular I discuss how the collectivity of an excitation can be used as a potential measure of 'plasmonicity' and how, despite the small size of the systems, large field enhancements can be achieved analogously to classical plasmonics.

[1] Fitzgerald, Jamie M., et al. "Quantum plasmonics." Proceedings of the IEEE 104.12 (2016): 2307-2322.
[2] Fitzgerald, Jamie M., and Vincenzo Giannini. "Perspective on molecular quantum plasmonic nanoantennas.", J. Opt.19 (2017) 060401
[3] Fitzgerald, Jamie M., Sam Azadi, and Vincenzo Giannini. "Quantum plasmonic nanoantennas." Physical Review B 95.23 (2017): 235414

Einladende: D. Reiter