

SFB 767

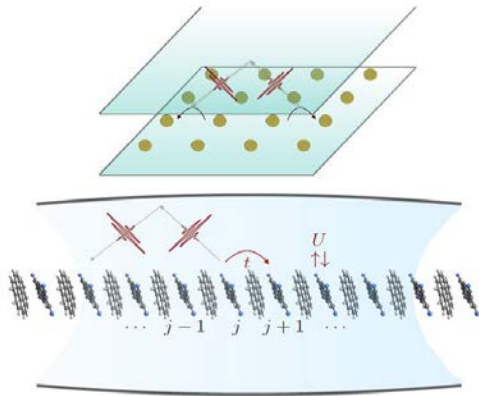
Colloquium

June 27, 2019
Coffee and tea 15:15
Talk 15:30
P 603



Dr. Frank Schlawin
University of Oxford

Cavity-mediated electron interactions and Mott polaritons in quantum materials



Recent years have witnessed the development of a new generation of nanoplasmonic cavities, which can reach the ultrastrong coupling regime with cyclotron transitions in two-dimensional electron gases [1]. This has triggered considerable interest in the possibility of manipulating electronic ground states and shaping collective excitations in two-dimensional materials with cavities.

In my talk, I will provide an overview of current ideas and challenges in this emerging field. Specifically, I will discuss our proposal of inducing electronic interactions through the coupling to a cavity [2]. Such interactions, mediated by the transverse electromagnetic field, are restricted to unobservably low temperatures in free space. I will argue that the strong confinement in nanoplasmonic cavities could enhance these exotic effects to experimentally accessible temperatures. Furthermore, at the hand of the 1D Fermi-Hubbard model, I will describe how the strong coupling to a cavity can affect the ground and excited states of correlated electron materials [3].

Contact:

G. Burkard, 5256



[1] G. Scalari, et al., *Science* 335, 1323 (2012); Q. Zhang et al., *Nature Phys.*, 12, 1005 (2016);
A. Bayer et al., *Nano Lett.* 17, 6340 (2017)

[2] F. Schlawin, A. Cavalleri and D. Jaksch, *Phys. Rev. Lett.* 122, 133602 (2019)

[3] M. Kiffner, J. R. Coulthard, F. Schlawin, A. Ardavan and D. Jaksch, *Phys. Rev. B* 99, 085116 (2019)