



Physical Sciences Seminar

Manipulating matter with vacuum fields: cavity-mediated transport in disordered quantum Hall systems

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Host: Johannes Fink

The manipulation of matter by giant vacuum fields in electromagnetic resonators is an emergent topic in physics and chemistry [1]. In this seminar, after a general introduction, we will see how the cavity vacuum fluctuations can dramatically affect the physics of disordered quantum Hall systems. In particular, we will show how, in the presence of electronic disorder, the cavity can mediate long-range electron hopping via the exchange of virtual photons, involving both edge and bulk states [2]. Such an effect can produce a breakdown of the topological protection of the integer quantum Hall effect as demonstrated in recent transport experiments [3]. Future perspectives will be discussed.[1] F. J. Garcia-Vidal, C. Ciuti, T. W. Ebbesen, Manipulating matter by strong coupling to vacuum fields, *Science* 373,178 (2021).[2] C. Ciuti, Cavity-mediated electron hopping in disordered quantum Hall systems, *Phys. Rev. B* 104, 155307 (2021).[3] F. Appugliese, J. Enkner, G. L. Paravicini-Bagliani, M. Beck, C. Reichl, W. Wegscheider, G. Scalari, C. Ciuti, J. Faist, Breakdown of the topological protection by cavity vacuum fields in the integer quantum Hall effect, preprint arXiv:2107.14145 (2021)

Monday, December 6, 2021 11:00am - 12:00pm

Heinzel Seminar Room / Office Bldg West (I21.EG.101) & Online via Zoom



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