

Jozef Stefan Institute, Department of Theoretical Physics

Solid State Group Seminars

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**A numerical method to compute optical
conductivity based on the pump-probe
simulations and its application to the hall-filled
one-dimensional extended Hubbard model**

A numerical method to calculate optical conductivity based on a pump-probe setup is discussed [1]. Its validity and limits are demonstrated both in equilibrium and out of equilibrium. By employing either a step-like or a Gaussian-like probing vector potential, it is found that in nonequilibrium, the method can be related to the linear response theory [2] or a different generalized Kubo formula [3], respectively. The observation reveals the probe-pulse dependence of the optical conductivity in nonequilibrium. The numerical method is applied to nonequilibrium optical responses in the various phases of the hall-filled one-dimensional extended Hubbard model [4,5].

[1] C. Shao, T. Tohyama, H.-G. Luo, and H. Lu, arXiv:1507.01200

[2] Z. Lenarcic, D. Golez, J. Bonca, and P. Prelovsek, Phys. Rev. B 89, 125123 (2014).

[3] G. De Filippis, V. Cataudella, E. A. Nowadnick, T. P. Devereaux, A. S. Mishchenko, and N. Nagaosa, Phys. Rev. Lett. 109, 176402 (2012).

[4] H. Lu, C. Shao, J. Bonca, D. Manske, and T. Tohyama, Phys. Rev. B 91, 245117 (2015).

[5] N. Bittner, T. Tohyama, D. Manske, in preparation.

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