

Theory of Condensed Matter: Hard Condensed Matter

April 14, 2016 at 2 p.m.

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Non-equilibrium Electrons Dynamics as Observed in Time-Resolved Photoemission

Photoemission is a well established phenomenon and an instrument for physical studies with more than a hundred years history (photoelectric effect). Thanks to recent advances in ultrafast lasers and streaking techniques it became possible [1, 2] to trace the electron dynamics accompanying this process on the attosecond time-scale. In my talk I will address from theoretical point of view the following facets of such dynamics: i) time delay of electrons experiencing extrinsic and intrinsic energy losses [3] as observed in recent experiment on bulk Mg [4]; ii) transient build up of plasmonic excitations in C60 and emission of the secondary electron [5,6]; iii) long-lived quantum beatings resolved in time by two-photon photoemission from antiferromagnetic NiO [7]. I will also briefly present a methodological aspect of such studies, namely propagation of the coupled electron-boson Kadanoff-Baym equations describing the non-equilibrium electrons dynamics.

References:

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- [4] C. Lemell et al. Real-time observation of collective excitations in photoemission, *Phys. Rev. B* 91, 241101(R) (2015)

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[7] K. Satitkovitchai, Y. Pavlyukh, and W. Hübner, Ab initio study of spin-orbit coupling effects on the low-lying excited states of NiO, *Phys. Rev. B.* 72, 045116 (2005)