Ground-state and out-of-equilibrium properties of quasi one-dimensional materials

D. Bugini[1,2], A. Crepaldi[1], G. Gatti[1], S. Roth[1], C. Dallera[2], E. Carpene[3] and M. Grioni[1]
[1] *Institute of Physics (IPHYS), École Polytechnique Fédérale de Lausanne (EPFL), CH-1015 Lausanne, Switzerland*
[2]*Dipartimento di Fisica, Politecnico di Milano, 20133 Milano, Italy*
[3]*CNR-IFN, Dipartimento di Fisica, Politecnico di Milano, 20133 Milano, Italy*

Email: davide.bugini@epfl.ch

Quasi one-dimensional (1D) systems exhibit exotic phenomena such as non-Fermi liquid behavior, Fermi surface instabilities and non-conventional superconductivity, and are also of interest for possible applications in novel nanoscale quantum devices. We exploited high-resolution ARPES and time-resolved ARPES (trARPES) to study the electronic structure and the out-of-equilibrium dynamics of the 1D compounds (TaSe4)2I and Nb2PdS5.
(TaSe4)2I is a paradigmatic charge density wave system, where a strong electron-phonon coupling drives a transition to an incommensurate, insulating phase below T_{CDW}=263 K [1]. Nb2PdS5 is a superconductor below T=6.5 K, with an unusually large upper critical field [2], and could realize the non-conventional Farrel-Fulde-Larkin-Ovchinnikov (FFLO) state.
Our results provide detailed information on the Fermi surface and the nature of the quasiparticles of these compounds, and a new perspective on the origin of their instabilities.

References

[1] C. Tournier-Colletta, L. Moreschini, G. Autès et al 2013, *Phys. Rev. Lett*. **110**, 236401
[2] Q. Zhang, G. Li, D. Rhodes 2013, *Sci. Rep*. **3**, 1446