O 2: Invited Talk Grioni

Time: Monday 9:30–10:15 Location: H36

Invited Talk O 2.1 Mon 9:30 H36

Broken symmetry states at surfaces: the ARPES view — •Marco Grioni — IPN-EPFL, Lausanne, Switzerland

The surface of a solid may exhibit electronic phases that break a symmetry present in the material's bulk. Photoelectron spectroscopy (ARPES) with high energy and momentum resolution can probe the properties of such electronic states with a rather unique sensitivity and selectivity. Here I will briefly discuss two such examples. Peculiar surface structures result from qualitatively different mechanisms: enhanced surface correlations in the former, and the genuine breaking of an underlying symmetry in the latter.

In the layered materials $1T$-$TaSe_2$ the interplay of temperature-dependent charge-density-waves (CDW) and electronic correlations yields a bandwidth-controlled metal-insulator surface transition on top of a metallic bulk. ARPES reveals the breakdown of the Fermi surface and the disappearance of the coherent quasiparticle weight.

In the epitaxial $PbAg_2$ alloy formed at the Ag(111) surface, the breaking of inversion symmetry in the presence of spin-orbit interaction lifts the Kramers' spin degeneracy, and states of opposite spin are separated in momentum. The giant splitting ($\Delta k = \pm$ 0.13 $\mathring{A}$) observed by ARPES cannot be explained by a standard free-electron (Rashba-Byckhov) model, and points to the crucial role played by the formation of the chemical bonds.