Angle-resolved photoemission study of actinide compounds

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Angle-resolved photoemission (ARPES) studies of uranium compounds provides extensive insight into the electronic structure and are crucial for comprehension of the wide range of ground state properties found in actinide materials such as magnetism or enhanced mass. We present ARPES results of several magnetic uranium compounds including layered tetragonal UAsSe, USb_2 and rock-salt USb and UTe. The layered *5f*-electron materials display a characteristic electronic structure in the vicinity of the Fermi edge: a very sharp and dispersive photoemission peak, which is a fingerprint of the *5f* density of states. The very high energy and momentum resolution allows observation of tens of meV dispersion both in normal emission and in-plane ARPES spectra in all of investigated uranium materials. Our results support theoretical models, which assume narrow bands and hybridization between the *5f* electrons and the conduction band. In the case of layered compounds (USb_2 and UAsSe) ARPES measurements revealed intriguing properties of the electronic structure. Our photoemission results show that the U*5f* electrons are more localized along the *c* axis (Γ to Z direction of the Brillouin zone) whereas they are hybridized in the uranium plates (Γ to X and Z to R directions).

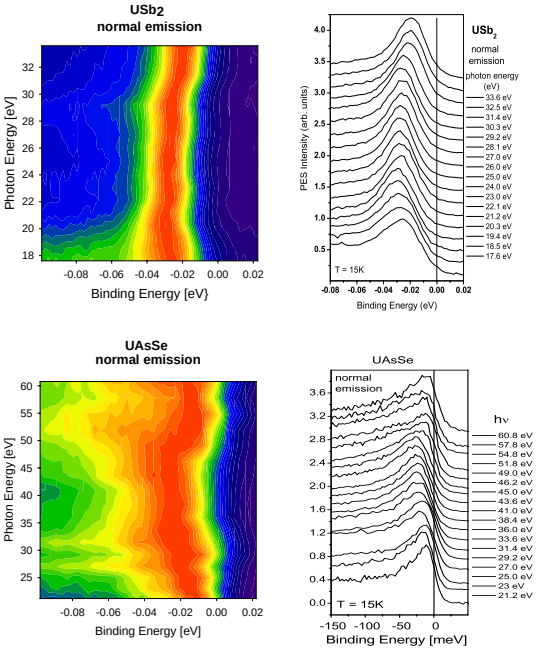

Fig. 1. Normal emission ARPES spectra of USb_2 and UAsS show tens of meV dispersion.

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