Metal-insulator transition in Sr_2IrO_4 investigated by ARPES

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Sr_2IrO_4 is a layered perovskite, structurally very similar to cuprates. Iridium is a *5d* transition metal, for which much smaller electronic correlations are a priori expected compared to cuprates, due to the much larger spatial extension of *5d* orbitals compared to *3d* ones. Nevertheless, Sr_2IrO_4 is an insulator, despite having an odd number of electrons in *5d* band, and orders antiferromagnetically below 240 K. This is believed to be the consequence of the large spin-orbit coupling, characteristic of this heavy element. It reshapes the electronic structure to form a non-degenerate half-filled band at the Fermi level, which is much more sensitive to electronic correlations than the original electronic structure. This electronic structure is also very analogous to that of cuprates, so that theoreticians have proposed that doped compounds could be superconducting. Although no bulk systems have been found superconducting up to now, signs of superconductivity may have been observed recently in surface doped systems of Sr_2IrO_4 [1].

We have doped Sr_2IrO_4 through Sr/La and Ir/Rh substitutions to approach the metal-insulator transition. We will present Angle-Resolved Photoemission (ARPES) studies of the evolution of the electronic structure with doping[2]. We observe shifts of the Fermi level inside the gap and transfer of spectral weight across the gap that we will discuss.

1. Y. K. Kim, N. H. Sung, J. D. Denlinger and B. J. Kim, *Observation of a d-wave gap in electron-doped Sr_2IrO_4,* Nature Physics **12**, 37 (2016)

2. V. Brouet et al. *Transfer of spectral weight across the gap of Sr_2IrO_4 induced by La doping,* Physical Review B **92**, 081117(R) (2015)