Abstract Submitted
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The role of correlations in the low energy electronic structure of ligthly electron doped Sr_2IrO_4 and $Sr_3Ir_2O_7$. ALBERTO DE LA TORRE, FLAVIO BRUNO, ZHIMING WANG, ANNA TAMAI, CHRISTOPHE BERTHOD, DIDIER JACCARD, University of Geneva, ALASKA SUBEDI, Max Planck - Hamburg, ANTOINE GEORGES, Ecole Polytechnique, CNRS, ROBIN PERRY, University College London, FELIX BAUMBERGER, University of Geneva — We characterized the emergence of exotic electronic ground states in lightly electron doped $(Sr_{1-x}La_x)_2IrO_4$ and $(Sr_{1-x}La_x)_3Ir_2O_7$ by ARPES. In the single layer iridate, a large Fermi surface with nodal coherent spectral weight and antinodal pseudogap emerges, concomitantly with the collapse of the Mott gap, upon doping [1]. On the other hand, in $Sr_3Ir_2O_7$ a small non-gapped Fermi surface with coherent quasiparticles, together with a reduction of the correlated gap throughout the entire Brillouin Zone is observed when doping above the insulator to metal transition [2]. By comparing the electronic structure of these two materials, we provide evidence that the interplay between spin-orbit and electron-electron correlations (U) in $(Sr_{1-x}La_x)_2IrO_4$ and $(Sr_{1-x}La_x)_3Ir_2O_7$ is rather different: while in Sr_2IrO_4 this interplay results in a pseudospin-1/2 single band Mott insulator with a phenomenology very similar to that of cuprates, in $Sr_3Ir_2O_7$ U enhances the bilayer splitting gap to originate a ground state resembling that of a correlated semiconductor. [1] A. de la Torre et al, PRL 115, 176402 (2015); [2] A. de la Torre et al, PRL 113, 256402 (2014)

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