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Theory of quantum matter

Jeudi 18 Novembre 2021, 14 :00
LPTHE, INSP Jussieu towers 22-23 room 3-17 and zoom(https ://us06web.zoom.us/j/81191889705?pwd=bGpseThPb2xsYWt2NC9vcFpNcHY0UT09)
Domaines : cond-mat.mtrl-sci—cond-mat.str-el

Titre : *Investigation of a strongly correlated material by quantum cluster techniques : Electronic, magnetic and spectral properties of Sr2IrO4*

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Résumé : *5d iridium oxides are of high interest due to the potential for new quantum states driven by strong spin- orbit coupling. In* Sr_2IrO_4*, the low-energy physics of the material is well described by a so-called* $j_{eff} = 1/2$ *state, which consists of a quantum superposition of the three Ir* t_{2g} *orbitals. Moreover, the interplay of electron-electron interactions and spin-orbit coupling leads to an unconventional Mott insulating state, whose spectral properties strongly resemble those of isostructural cuprates. Despite not being superconducting upon doping down to lowest temperatures, the analogy with cuprates is corroborated by Fermi surface and pseudogap properties of doped* Sr_2IrO_4*, which suggests an effective minimal one-band model in terms of the* $j_{eff} = 1/2$ *state. However, the k-dependent orbital composition of this state and recent measurements of its magnetization density distribution cast the validity of a local* $j_{eff} = 1/2$ *picture into doubt.*

In this talk, I will use two complementary quantum cluster techniques to study selected electronic, magnetic and spectral properties of this strongly correlated material. The results of our simulations will be compared to different experimental probes and the validity and limitations of an established one-band model of Sr_2IrO_4 *will be discussed.*