



TRR 80 Seminar

Am Dienstag, den 16. Januar 2018 um 16:00 Uhr

spricht

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über das Thema

RIXS on face-sharing iridates: From $j=1/2$ to quasi-molecular orbitals

Spin-orbit entangled $j=1/2$ Mott insulators set the stage for fascinating novel quantum states of matter. In corner-sharing geometry of the IrO_6 octahedra, one finds strong Heisenberg exchange between $j=1/2$ moments, while edge-sharing geometry features bond-directional Kitaev exchange. The case of face-sharing octahedra has hardly been explored. Using resonant inelastic x-ray scattering (RIXS), we study $\text{Ba}_3\text{M}\text{Ir}_2\text{O}_9$ with face-sharing octahedra forming triangular layers. Both spin-orbit coupling and hopping are large within the bioctahedra. For $\text{M}=\text{Ce}^{4+}$ with Ir $5d^5$ configuration, the RIXS data reveal the first and exceptionally clean realization of the quasi-molecular-orbital scenario that was debated extensively (but refuted) for Na_2IrO_3 . The ground state shows a total $j=0$ singlet predominantly built from $j=1/2$ moments with the corresponding triplet excitation lying at an extraordinarily large energy. In $5d^5$ $\text{Ba}_3\text{Ti}_{3-x}\text{Ir}_x\text{O}_9$ with Ti/Ir site disorder, we observe a coexistence of quasi-molecular singlets and $j=1/2$ moments, explaining the unusual behaviour of the magnetic susceptibility. Finally, we establish a quasi-molecular-orbital character of the electronic states in the putative spin liquid $\text{Ba}_3\text{InIr}_2\text{O}_9$ with mixed-valence $\text{Ir}^{+4.5}$ ions.

Gäste sind herzlich willkommen!

Der Vortrag findet im Seminarraum S-288/Physik-Süd, Universität Augsburg statt.

Gastgeber: Prof. Dr. Philipp Gegenwart

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