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Jahn-Teller effect in systems with strong on-site spin-orbit coupling EKATERINA PLOTNIKOVA, Leibniz Institute for Solid State and Materials Research Dresden, Germany, MARIA DAGHOFER, University of Stuttgart, Germany, JEROEN VAN DEN BRINK, Leibniz Institute for Solid State and Materials Research Dresden, Germany, KRZYSZTOF WOHLFELD, Stanford University and SLAC National Accelerator Laboratory, USA and University of Warsaw, Poland — When strong spin-orbit coupling removes orbital degeneracy, it would at the same time appear to render the Jahn-Teller mechanism ineffective. We discuss such a situation, the t_{2g} manifold of iridates, and show that, while the Jahn-Teller effect does indeed not affect the $j = 1/2$ antiferromagnetically ordered ground state, it leads to distinctive signatures in the $j = 3/2$ spin-orbit exciton. It allows for a hopping of the spin-orbit exciton between the nearest neighbor sites without producing defects in the $j = 1/2$ antiferromagnet. This arises because the lattice-driven Jahn-Teller mechanism only couples to the orbital degree of freedom, but is not sensitive to the phase of the wave function that defines isospin j_z. This contrasts sharply with purely electronic propagation, which conserves isospin, and presence of Jahn-Teller coupling can explain some of the peculiar features of measured resonant inelastic x-ray scattering spectra of Sr_2IrO_4.

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