# Lattice effects in spin-orbit entangled Mott insulators

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In magnets without orbital degeneracy, the lattice vibrations modulate the exchange coupling parameters (leading to, e.g., spin-Peierls effect), but do preserve the spin-rotational Heisenberg symmetry of the interactions. In transition metal compounds with unquenched orbital magnetism, however, the lattice vibrations affect the very form and symmetry properties of the effective magnetic Hamiltonians. Through the spin-orbit entanglement, Jahn-Teller orbital-lattice coupling in these compounds is converted into the anisotropic pseudospin-lattice interactions, whose form is dictated by lattice symmetry and thus can directly be manipulated by the external strains [1, 2]. These interactions may drive spin-quadrupole and structural transitions, and have a profound impact on low-energy spin and lattice dynamics. In particular, they lead to a coherent superposition of the magnon and phonon modes – magnetoacoustic waves [3], suggesting that the spin-orbit Mott insulators can be useful materials in the emerging field of terahertz magnonics.

In this talk, after an introduction to the family of spin-orbit Mott insulators, the above points will be discussed in the context of specific model compounds.

[1] H. Liu and G. Khaliullin, Phys. Rev. Lett. **122**, 057203 (2019).
[2] H.-H. Kim, *et al.*, Nat. Commun. **13**, 6674 (2022).
[3] H. Liu and G. Khaliullin, unpublished.