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Topological edge states in correlated honeycomb materials with strong spin-orbit coupling ANDREI CATUNEANU, HEUNG-SIK KIM, University of Toronto, OGUZHAN CAN, The University of British Columbia, HAE-YOUNG KEE, University of Toronto — We study the topological nature of single layers of correlated honeycomb materials α-$RuCl_3$ and A_2IrO_3 (A=Li, Na) with strong spin-orbit coupling. An effective tight-binding model based on first principles band structure calculations including Hubbard interaction and spin-orbit coupling is derived. Two pairs of propagating edge modes centered at the zone center and zone boundary are found when their one-dimensional boundary forms a zig-zag shape, while the bulk has a gap with trivial time-reversal Z_2 invariants. The effects of strong electronic interactions and doping on the edge modes in these Mott insulators are discussed. We further suggest a heterostructure of α-$RuCl_3$/$IrCl_3$ to search for the proposed topological Mott phase.

Andrei Catuneanu
University of Toronto

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