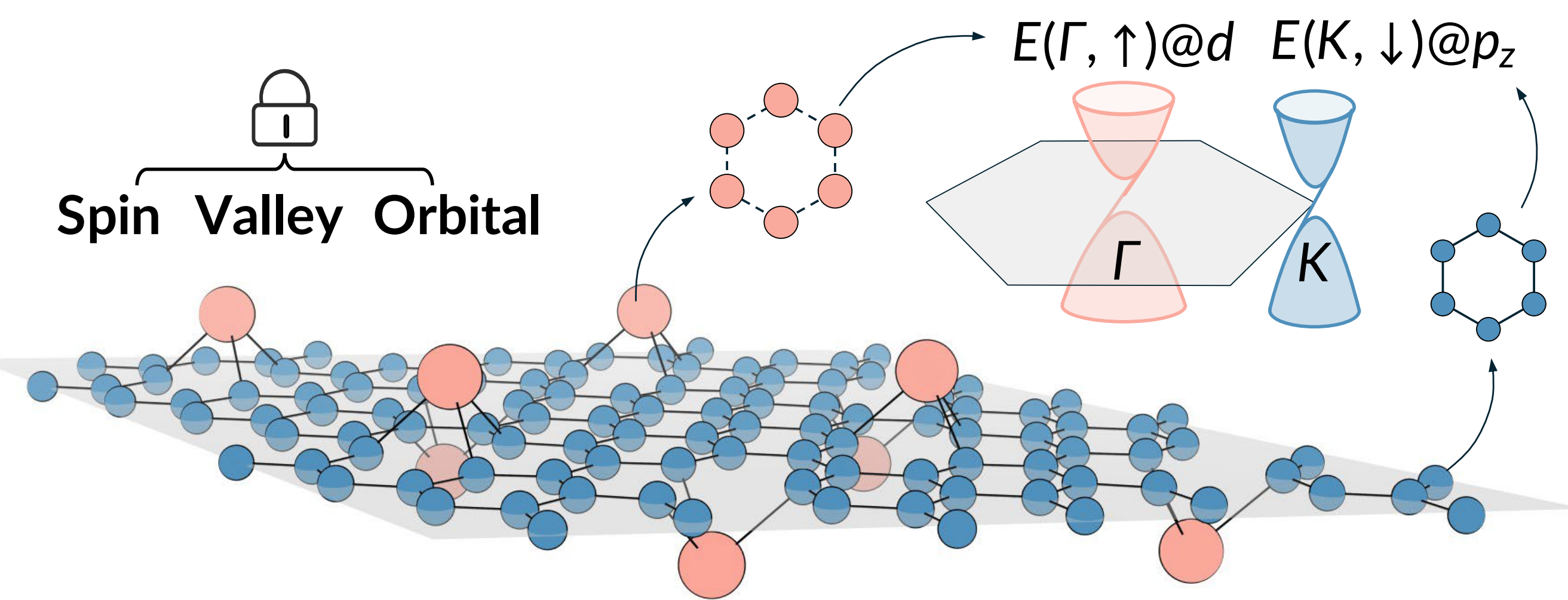


Spin-Valley-Orbital Triple-Locked: Unifying Quantum Anomalous Hall, Spin Hall, and Orbital Hall Effects in MX_{12} monolayer

Hongguo Zhang and Zhongqin Yang

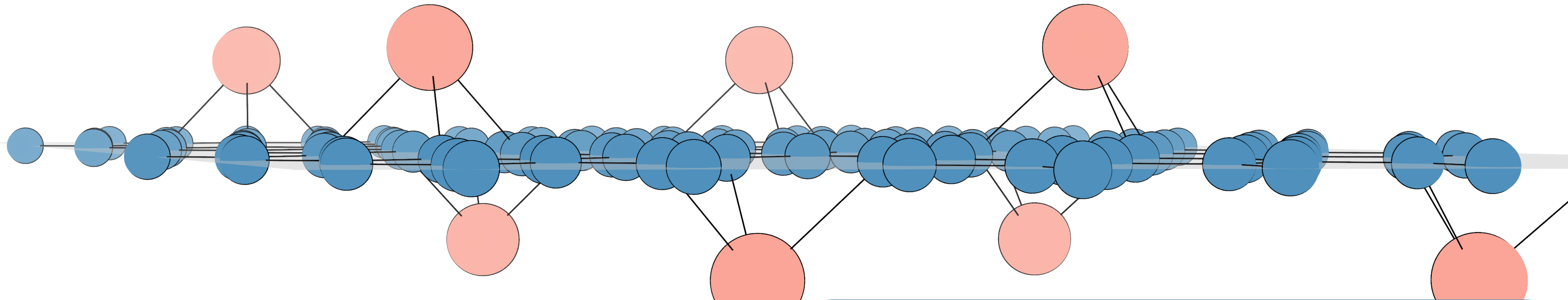
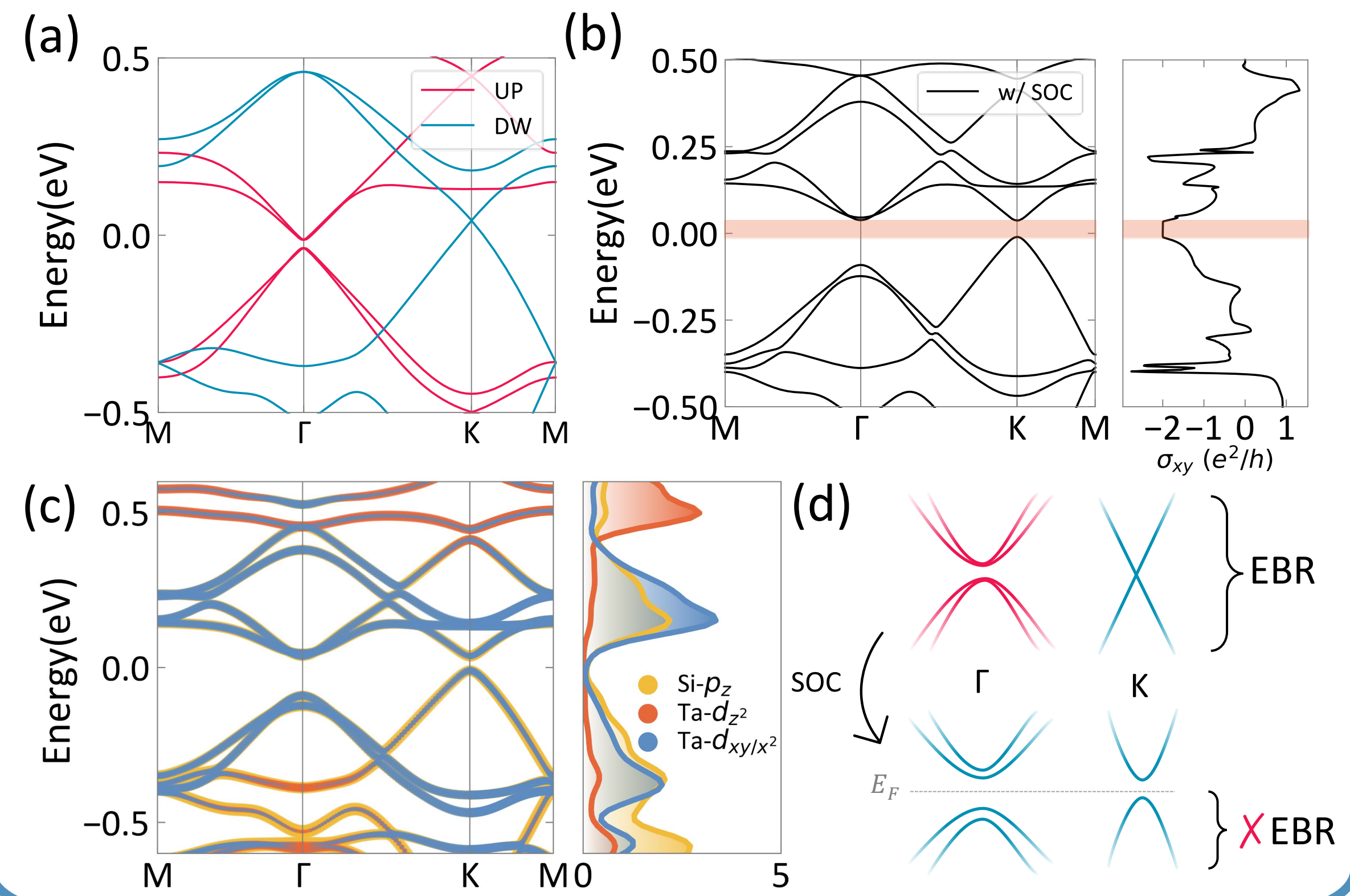
State Key Laboratory of Surface Physics and Department of Physics, Fudan University, Shanghai, China

Spin-Valley-Orbital Locked Effect

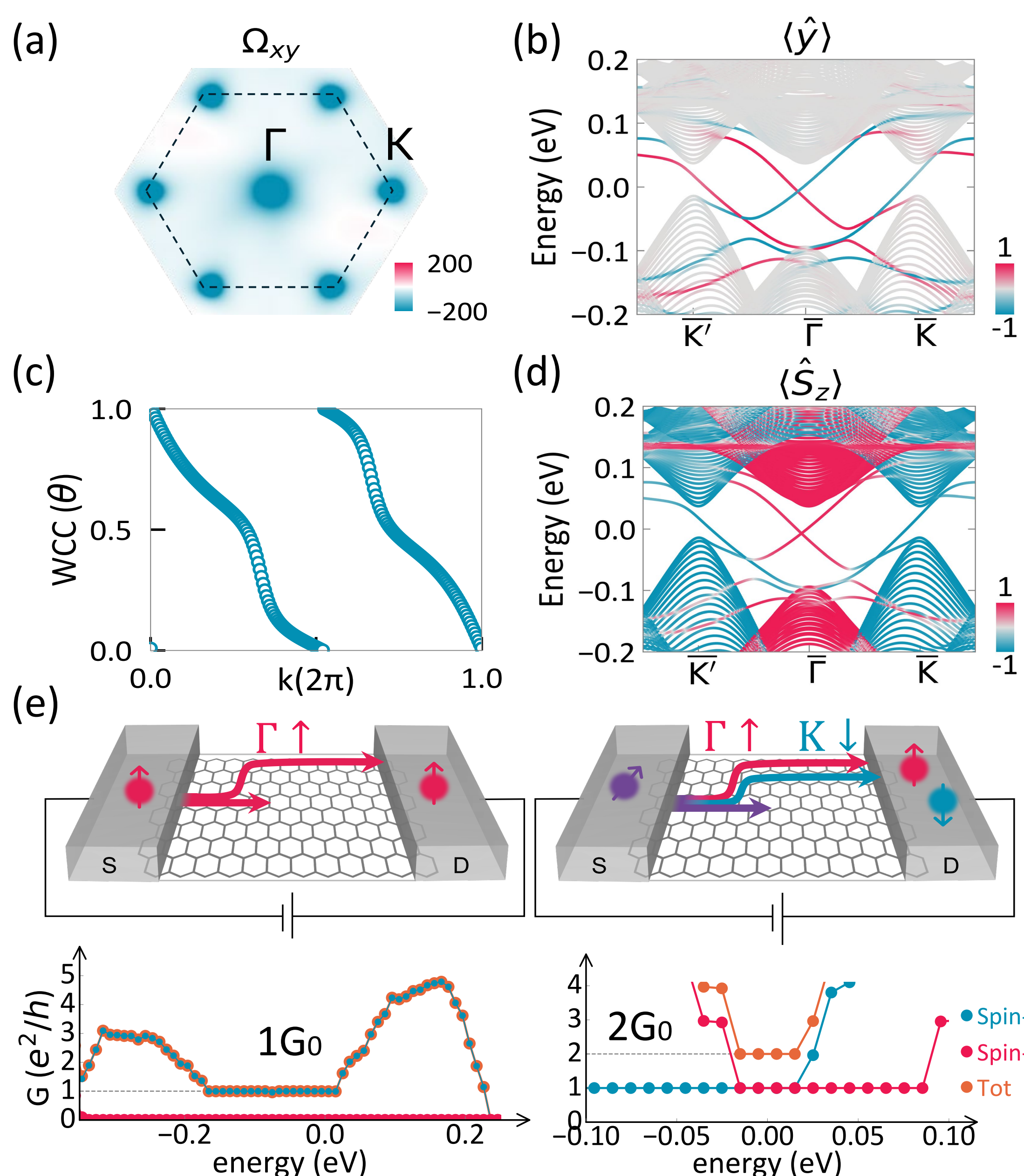


The large sublattice formed by M atoms (pink, magnetic) constitutes the d-orbital spin- \uparrow valley at the Γ point. While the sublattice of X atoms (blue, non-magnetic) constitutes the p-orbital spin- \downarrow valley at the K point.

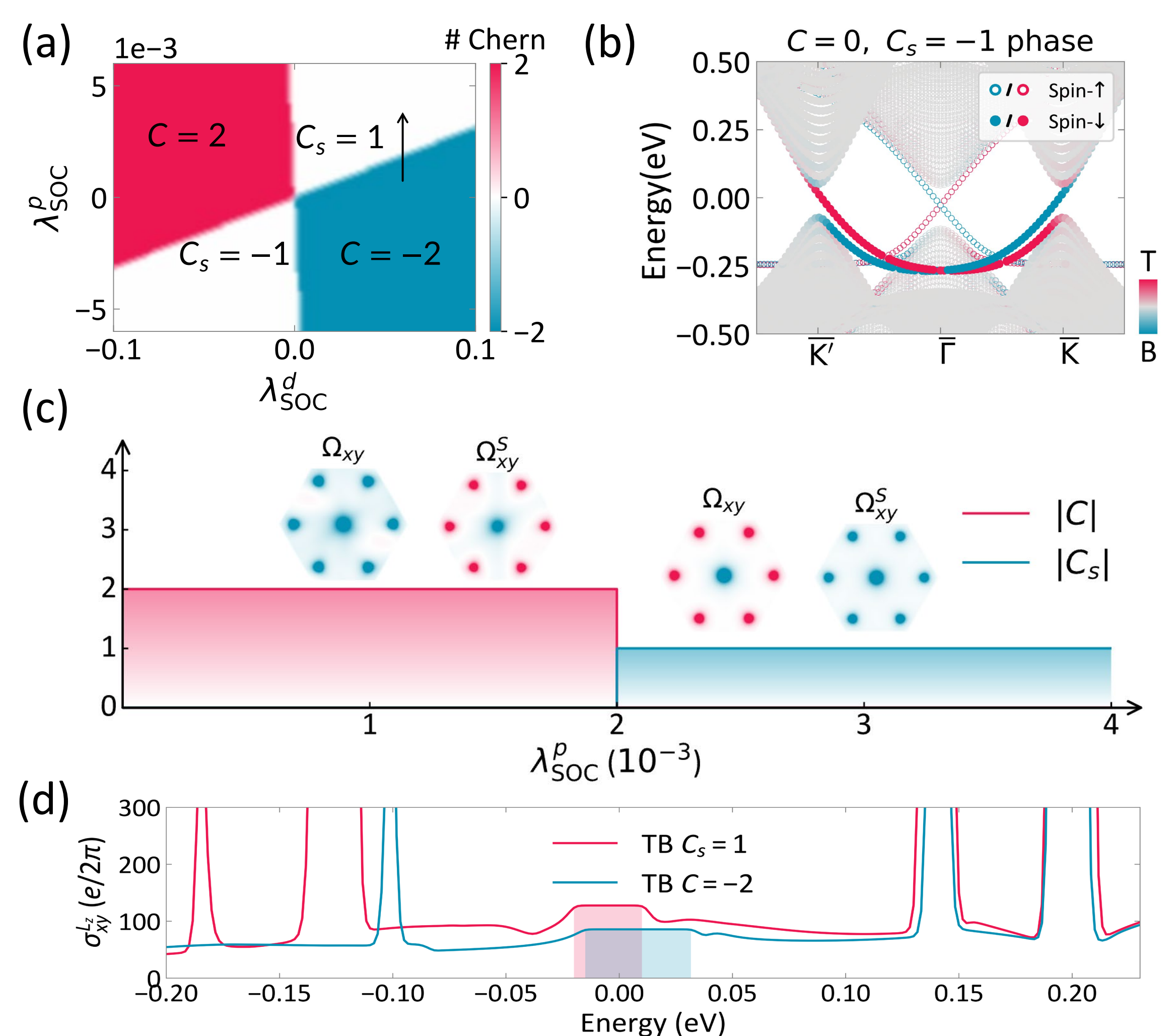
SOC-induced Topological Band Gap



Spin controlled Transport



Manipulate Berry Curvatures



Quantum anomalous Hall, spin-Chern Hall and orbital Hall effect can be manipulated via inversed valley Berry curvatures.