

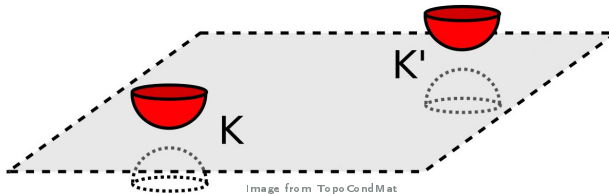
In search of the Chern insulator

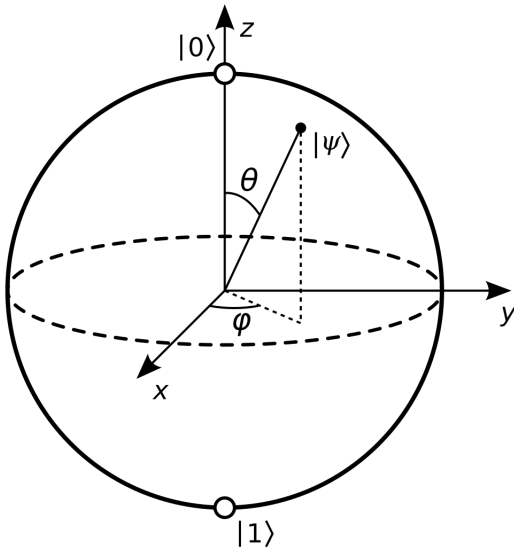


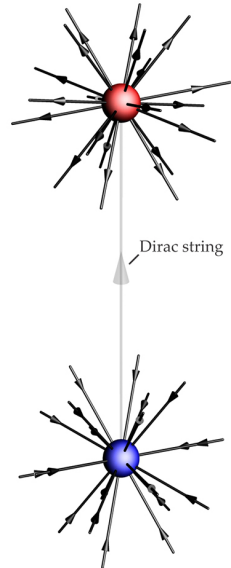
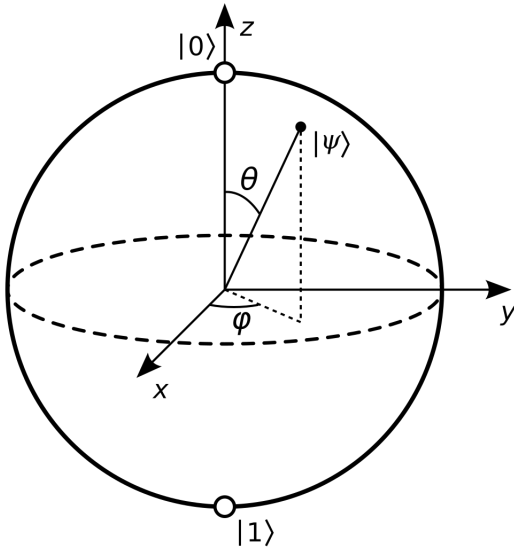
Haldane model



experimental realization of Chern insulators







Band structure of graphene

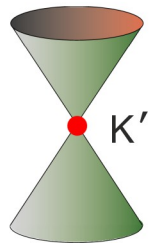
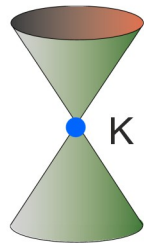
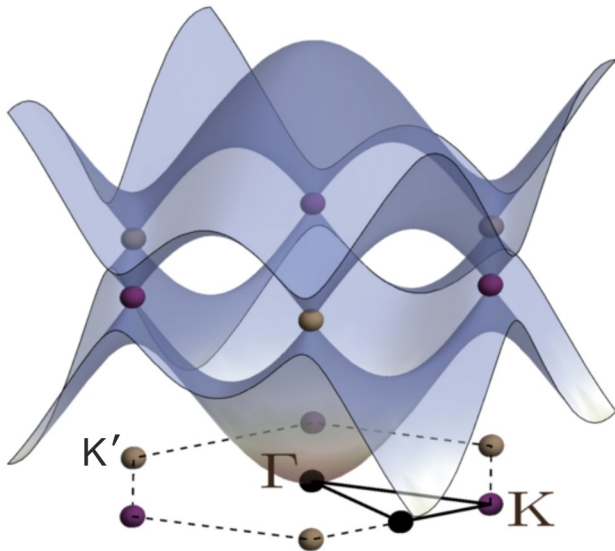


Image credit: Diracmaterials (CC-BY-SA) and Ethelbert White (fair use)

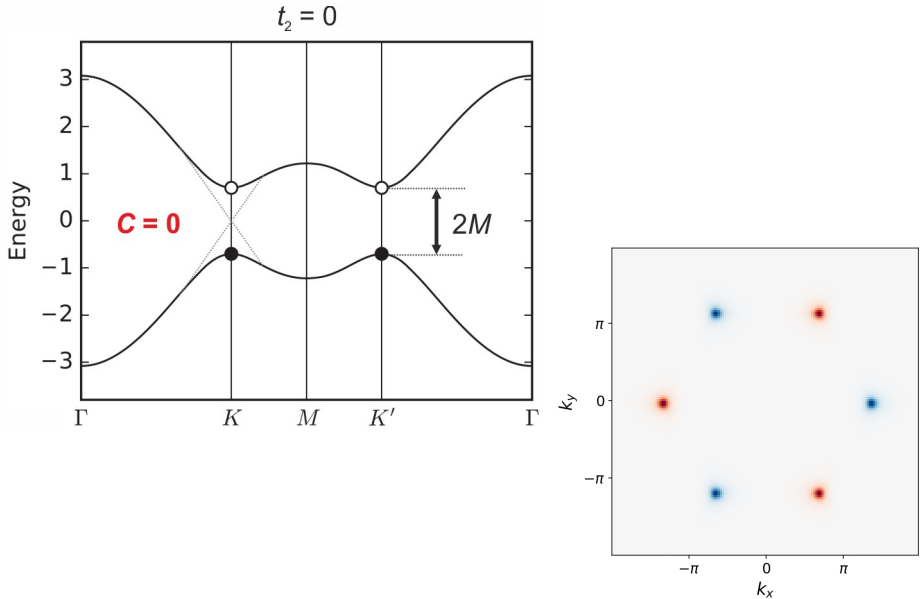
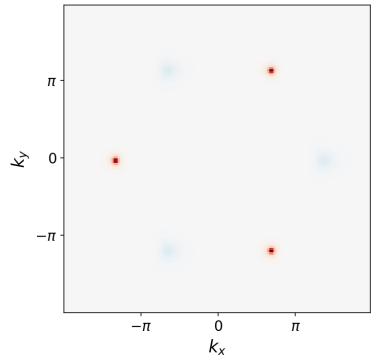
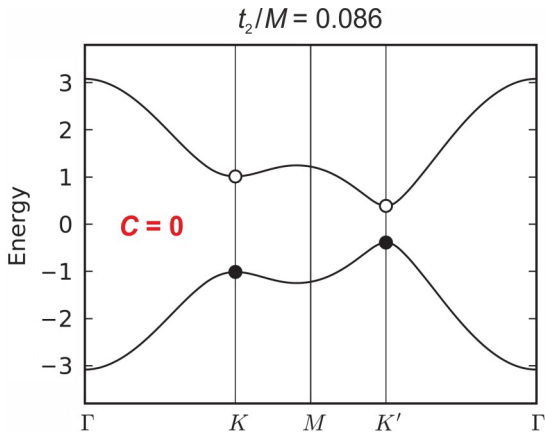


Image credits: Vanderbilt, Berry phases in electronic structure theory and TopoCondMat



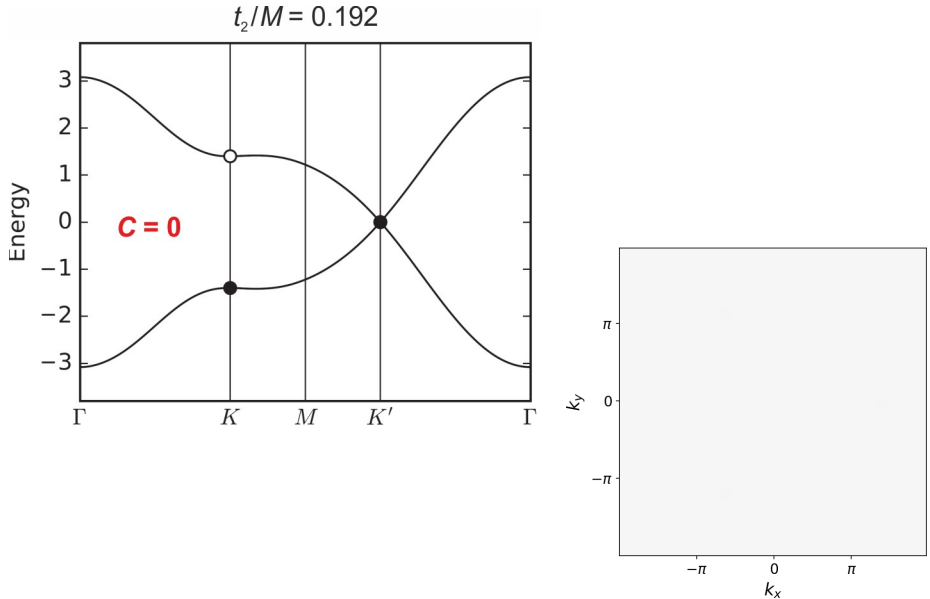


Image credits: Vanderbilt, Berry phases in electronic structure theory and TopoCondMat

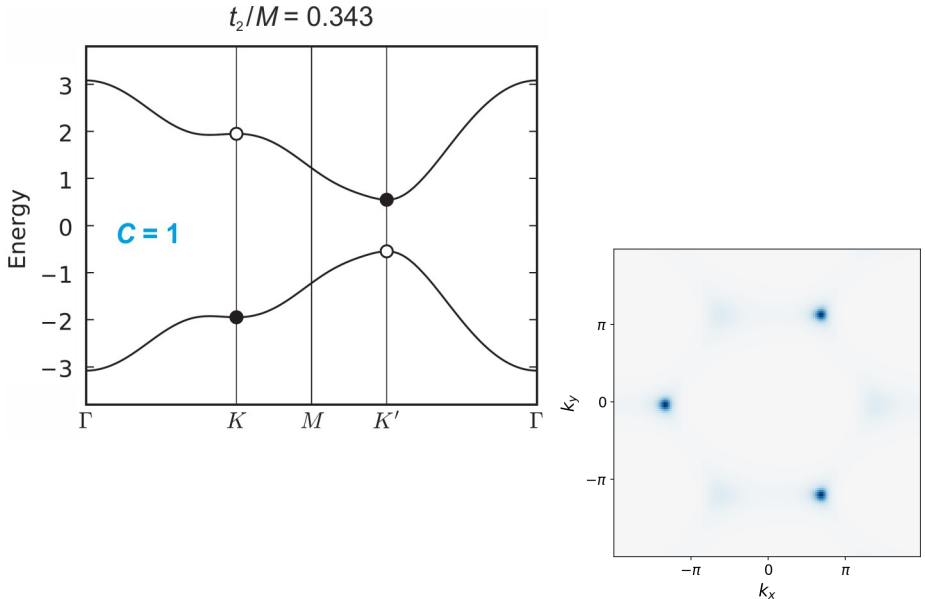


Image credits: Vanderbilt, Berry phases in electronic structure theory and TopoCondMat

Haldane diagram

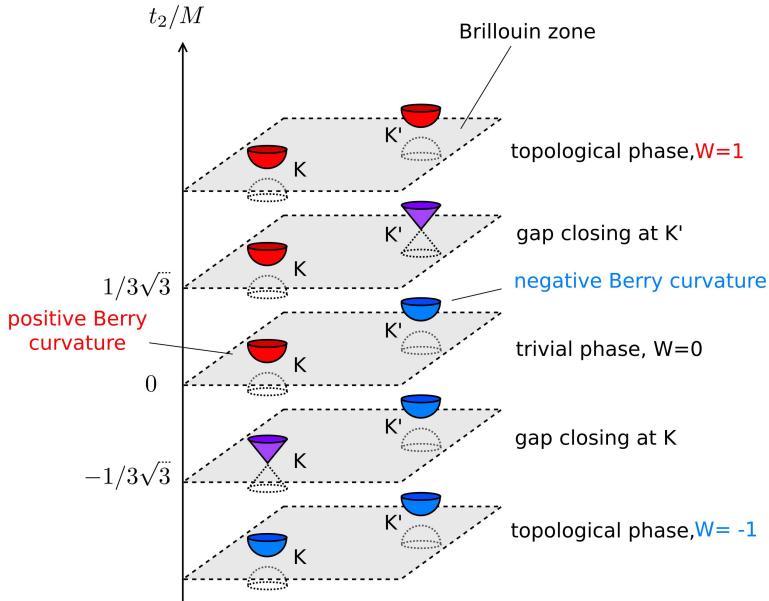


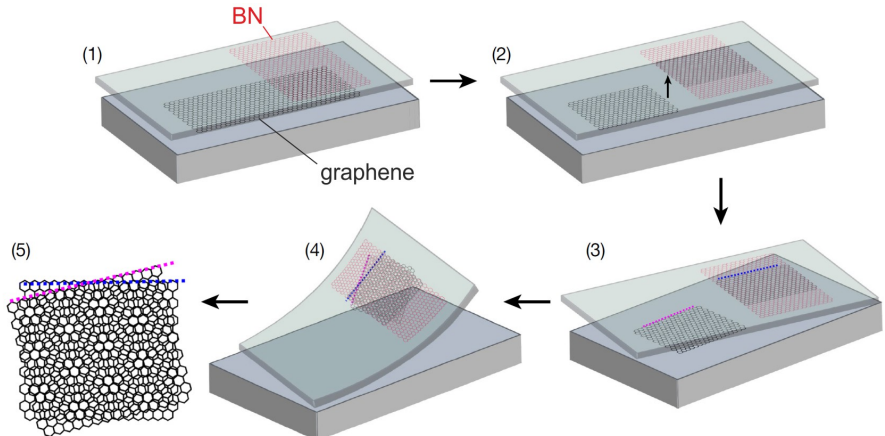
Image credit: Topo CondMat



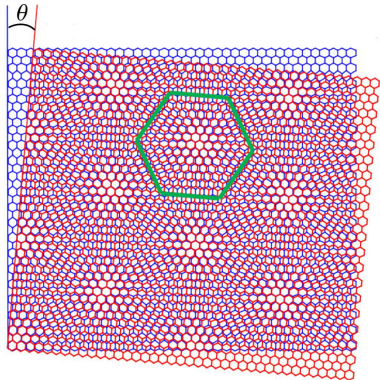
Open problem

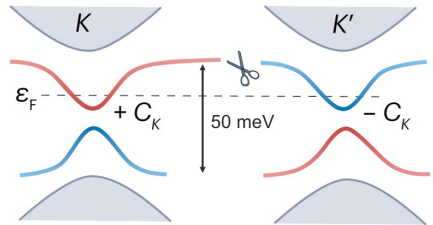
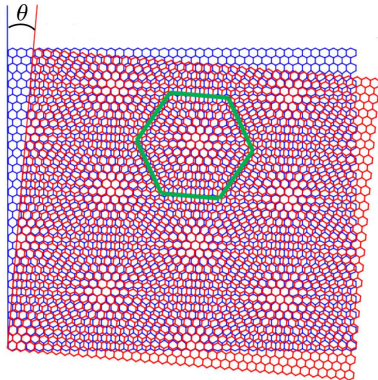
*experimental realization
of Chern insulators*

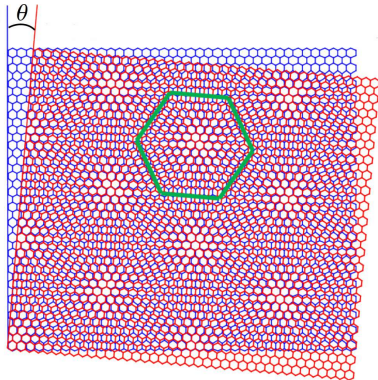
Fabrication of twisted bilayers



twisted bilayer graphene
on top of a BN flake

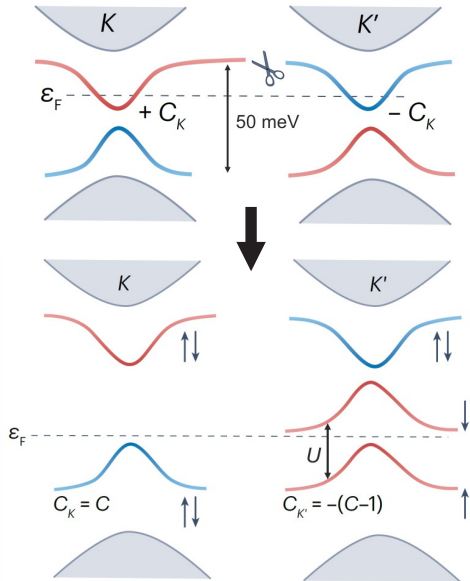


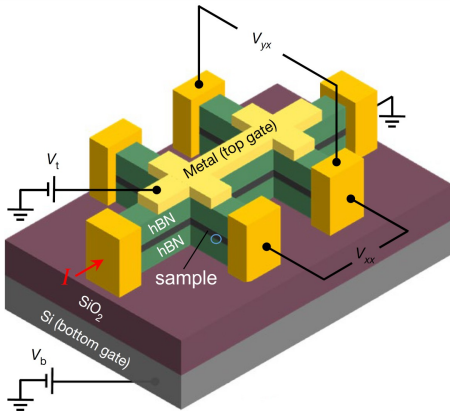




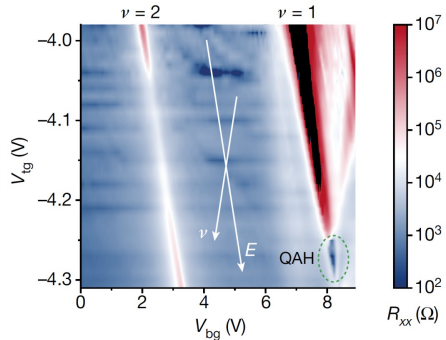
correlated
electrons?

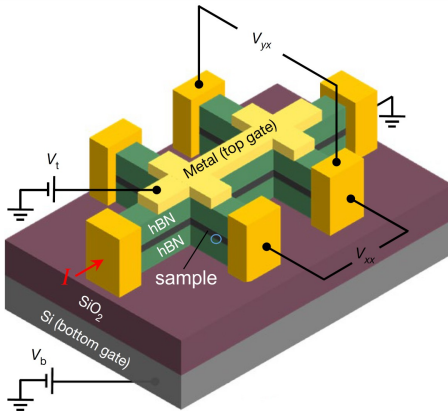
Ω (a.u.)



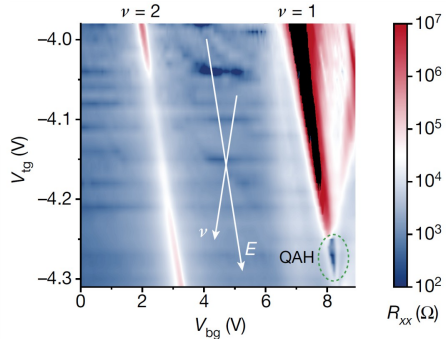
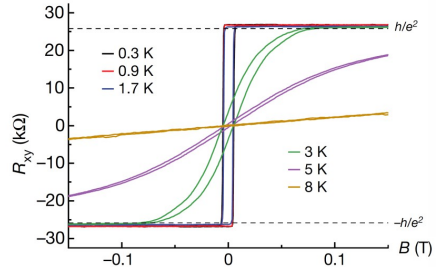


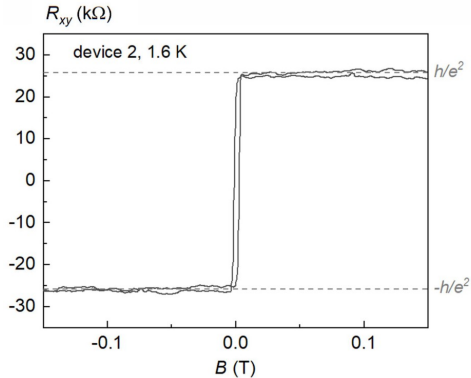
MoTe₂/WSe₂ moiré bilayer



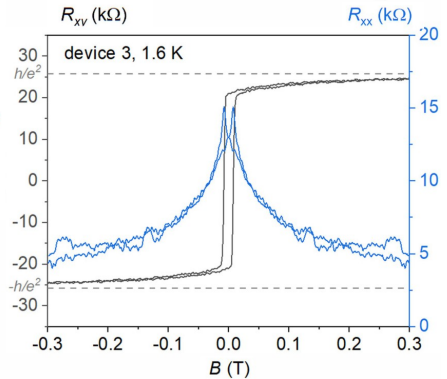


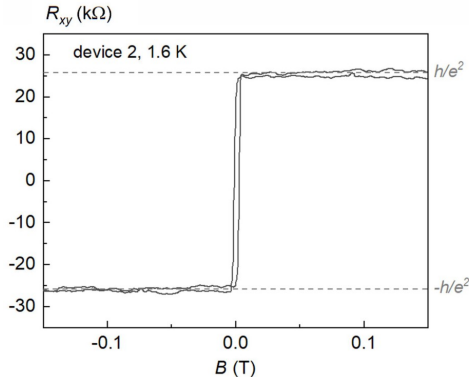
MoTe₂/WSe₂ moiré bilayer





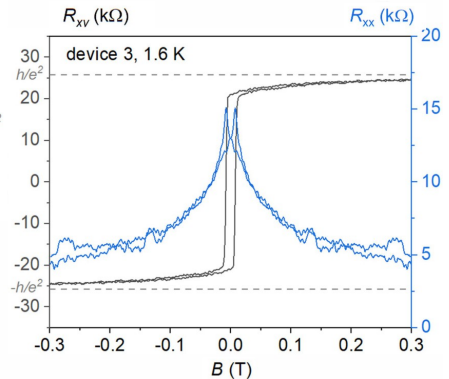
MoTe₂/WSe₂ moiré bilayer



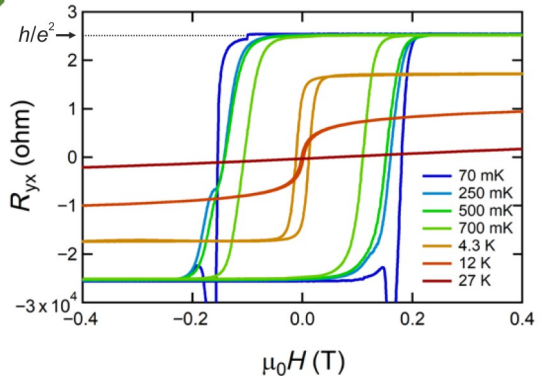
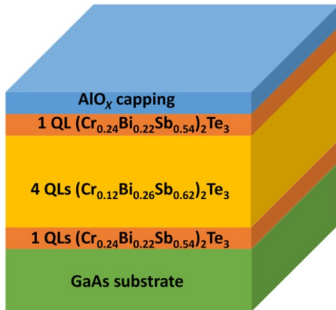


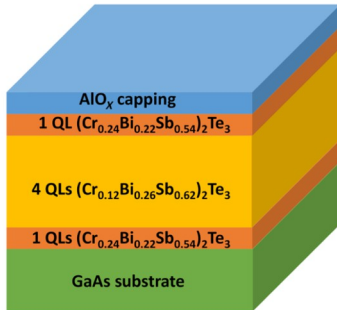
MoTe₂/WSe₂ moiré bilayer

quantized R_{xy} value possible,
but is it topologically protected?



Magnetic topological insulators





“Weak” topological state,
very low T 's required

Laughlin pump realized
in a similar material:

Nature Phys. **19**, 333 (2023)

