

# Chez Pierre

Presents ...

Friday, December 3<sup>rd</sup>, 2021

11:00 am



## Special Chez Pierre Seminar

**Giorgio Sangiovanni**–Universitaet Wuerzburg

**"Emergent honeycomb physics from chiral atomic orbitals on a triangular lattice".**

In the hunt for room-temperature quantum spin Hall insulators, bismuthene [1] has demonstrated the impressive advantage of a local spin-orbit coupling experienced by the in-plane p-orbitals. This alternative to pi-bond graphene can be pushed to a conceptually even more essential level upon halving the honeycomb lattice, i.e. considering chiral p-orbitals on a triangular lattice [2]. Here, we theoretically conceive and experimentally realize for the first time a triangular QSHI, "indenene", an indium monolayer exhibiting non-trivial valley physics and large gap. We identify an interference mechanism of the Bloch functions and the emergence of a hidden honeycomb pattern in the charge localization, which makes the topological classification accessible to bulk experiments, without the necessity of quantum edge transport.

[1] F. Reis, G. Li, L. Dudy, M. Bauernfeind, S. Glass, W. Hanke, R. Thomale, J. Schäfer and R. Claessen, *Science* 357, 287

(2017) <https://doi.org/10.1126/science.aai8142>

[2] M. Bauernfeind, J. Erhardt, P. Eck, P. K. Thakur, J. Gabel, T.-N. Lee, J. Schäfer, S. Moser, D. Di Sante, R. Claessen and G. Sangiovanni, *Nat. Commun.* 12, 5396 (2021)

<https://doi.org/10.1038/s41467-021-25627-y>