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M2Po3A-04: Higher order topology in hydrogenated graphite

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In graphite or multilayer graphene, strain can lead to relative twist in the alignment of neighboring interfaces. This results in the formation of stacking faults between regions of different twist angles. In two dimensions, a saddle point in the electronic band structure leads to a divergence in the density of states, also known as a Van Hove singularity (vHs). The energy difference between the vHs of the conduction and valence bands was found to increase with the twist angle between neighboring graphite domains with respect to the c axis.

In this work, we estimate a twist angle for the superconducting (SC)-like nano-size multi-layer granular domain in hydrogenated graphitic fibers*. We show that this twist angle and the twist angles found by others for few-layer graphene might actually form a certain mathematical sequence. We interpret this finding as yet another confirmation that SC in hydrogenated graphite has topological manifestations. By invoking Ginzburg formula, we find the existence of higher order topology as at least quadratic gap flattening.

Charge transport and magnetization measurements on the hydrogenated graphitic fibers have been done using the Quantum Design's Physical Properties Measurement System.

*N. Gheorghiu, C.R. Ebbing, T.J. Haugan, Superconductivity in Hydrogenated Graphites, arXiv:2005.05876 (2020).

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