# EFFECT OF THE EXTERNAL FIELDS IN HIGH CHERN NUMBER QUANTUM ANOMALOUS HALL INSULATORS

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Multilayer structures consisting of alternating magnetic and undoped topological insulator layers have been proved so far to be a convenient platform for creating a quantum Anomalous Hall state with a high Chern number [1]. However, in previous proposals, the Chern number can only be tuned by varying the doping concentration or the width of the magnetic topological insulator TI layers. This restricts the applications of the dissipationless chiral edge currents in electronics, since the number of conducting channels remains fixed. In this work, we propose a way of varying the Chern number at will by means of an external electric field applied along the stacking direction. The electric field generates the hybridization of the inverted bands, generating new topological channels. In this way, the number of Chern states can be tuned externally in the sample, without the need of modifying the number and width of the layers or the doping level. We showed that this effect can be uncovered by the variation of the transverse conductance as a function of the electric field at constant injection energy at the Fermi level. [2]

[1] Zhao, Y. F. et al., Nature, 588 (2020) 419

[2] Baba, Y et al. Phys. Rev. B 106, (2022) 245305

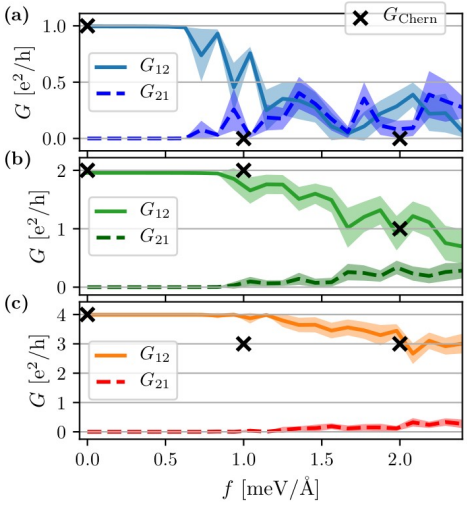


*Figure 1 – Conductance as a function of the electric field for a C=1 state (a), C = 2 (b) and C =4 (c); with C being the Chern number in the absence of electric field.*