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Topological Modes in 2D Dirac Materials

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In this work, the potential of the use of magnetic interface systems in bidimensional graphene for information propagation is studied, through an hydrodynamical approach, that also involves important theoretical concepts of topology, plasma physics and fluid dynamics. A characterization of the system is performed through the calculation of the Chern numbers of the different frequency bands of the system, and then, an analytical study of chiral and general solutions that propagate through an interface set in a graphene-field-effect-transistor (GFET) is performed. This includes the employment of concepts normally associated with equatorial wave dynamics in geophysics, and after arriving at interesting solutions, those results were tested using numerical simulations, ran using the source code DEDALUS. At the end, interesting properties about the bulk-edge correspondence promoted by the modes are inferred, the behaviour of the modes through time is evaluated, showing that the Kelvin mode has a very high potential in terms of information propagation, and it is arrived at a general conclusion that the Hall viscosity is not useful for the purpose of propagation through the interface.

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