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Séminaire du laboratoire Pierre Aigrain

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Domaines : cond-mat

Titre : *Helical quantum Hall phase in graphene on SrTiO₃*

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Résumé : *Helical edge states in topological insulators and semiconducting nanowires are attracting a tremendous amount of attention due to the prospect of inducing and manipulating Majorana states in superconducting hybrid devices. However, most of the topological systems studied so far for Majorana physics remain obscured by material issues such as bulk parasitic bulk conduction or inhomogeneous chemical potential. In this talk I will present a new type of topological insulator constructed on the basis of the quantum Hall effect of graphene. I will show that the ground state of charge neutral graphene under perpendicular magnetic field is a quantum Hall topological insulator with a ferromagnetic order that exhibits spin-filtered, helical edge channels. The topological phase emerges in the graphene zeroth Landau level via a suitable screening of the Coulomb interaction by a SrTiO₃ high-k dielectric substrate. We observed robust helical edge transport emerging at a magnetic field as low as 1 T and withstanding temperatures up to 110 K over micron-long distances. This new and versatile graphene platform opens up a promising avenue for topological superconductivity.*
