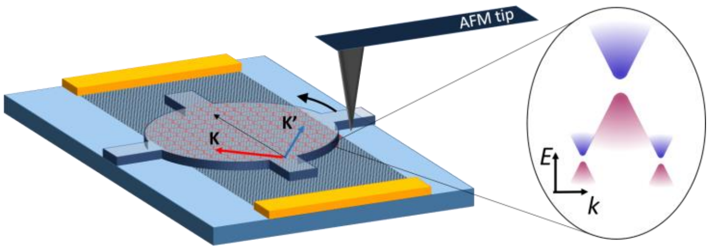
Postdoctoral offer

Probing valley topological currents in graphene

The first isolation of graphene, one atom thick layer of carbon atoms arrange in hexagons, in 2005 attracted a lot of attention given its remarkable characteristics: high carriers mobility, ambipolar behavior, great mechanical strength. Not long after this, other 2D layered materials were found to have also remarkable characteristics and host a large number of phenomena of condensed matter physics. A great technological achievement of our days is the stack of these 2D layers to form van der Waals (vdW) heterostructures [Nat. Nanotech 5, 722] and therefore combine the properties of each material to design materials with new properties [Nature 499, 419].

Contrary to conventional 2D materials, grown by molecular beam epitaxy, the layered vdW structures can be make of any combination of 2D materials, given that there are not restrictions of lattice parameter. Other degree of freedom of these heterostructures is the relative angular alignment between its layers, which can dramatically alter its fundamental properties. A remarkable example of this, predicted for certain vdW heterostructures, is the emergence of phases of matter where charge carriers flow without dissipation. In heterostructures of graphene crystallographically aligned with boron nitride (insulator isomorph to graphene), such a phase has been predicted. However, due to the scarcity of experimental tools to control the layer alignment the observations available remain inconclusive [Science 346, 448; Science adv. 4, eaaq0194].



During this postdoctoral appointment we propose to use a new technique to control the angular alignment between layers in a vdW heterostructure [Science 361, 690] to investigate the generation and control of electrical signals related to this phases of matter in graphene. The successful candidates will participate actively in sample fabrication (assembly of vdW heterostructures, angular control of layers using an AFM, micro and nanofabrication processes) and electronic transport measurements at low temperatures.

Qualifications: PhD in Physics or equivalent, experience in low temperature measurements, experience with micro and nano fabrication techniques for 2D materials is a bonus, and good communication skills in English (written and spoken).

Application: Send us an email with your CV, a motivation letter and arrange for three recommendation letters to be sent to us as well.

Contact: Rebeca RIBEIRO-PALAU

Centre for Nanoscience and Nanotechnologies (C2N) – PHYNANO group

Tel: +33 (0) 1 70 27 06 92; e-mail: rebeca.ribeiro@c2n.upsaclay.fr