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Controlling the current flow in 2D materials

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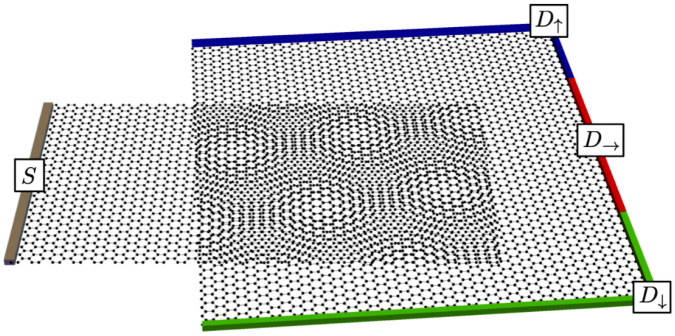

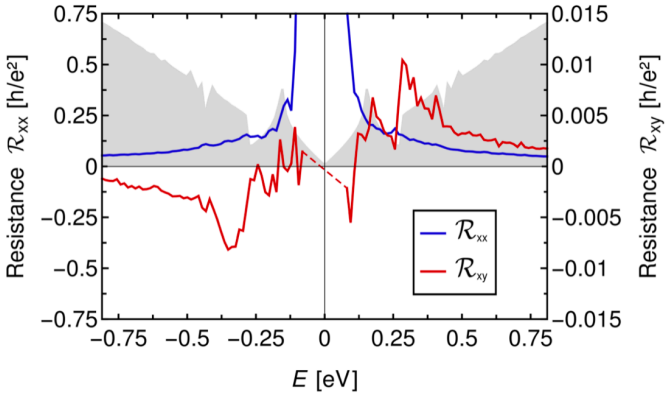

In this talk we review some recent work on controlling the current flow in 2D materiales. In monolayer graphene, a ballistic electron beam is refracted and reflected at the interface of a pn junction similar to a light beam at the interface of two materiales with different refractive index. When the interface of the junction varies smoothly this even allows to establish analogies to gradient-index optics and implement lenses for the current flow in graphene. Another strategy to control the current flow in graphene is to use elastic deformations that can generate strong pseudo-magnetic fields. In twisted bilayer graphene the current flow can be steered by means of the wist angle and electric gating. This steering gives rise to a non-local Hall resistance. In phosphorene the electric transport is highly anisotropic and shows negative reflection as well as anti-super-Klein tunneling, which can be used to construct perfect electron waveguides.