The Unruh Effect in Strained Graphene

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I will describe recent theoretical work [1] on how a spatially-varying quasiparticle velocity in honeycomb lattices, achievable using strained graphene or in engineered cold-atom optical lattices with a spatially-varying tunneling, can yield the Rindler Hamiltonian embodying an observer accelerating in Minkowski spacetime [2]. Within this setup, a sudden switch-on of the spatially-varying tunneling (or strain) yields a spontaneous production of electron-hole pairs, an analogue version of the Unruh effect characterized by the Unruh temperature [3, 4, 5]. I will discuss how this thermal behavior, accompanied by Takagi's Statistics Inversion [6], can be revealed in observables like photo-emission, scanning tunneling microscopy and optical conductivity.

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