

OMNIDIRECTIONAL PERFECT TRANSMISSION THROUGH STRUCTURED ELECTRIC BARRIERS IN GRAPHENE

Vít JAKUBSKÝ¹

¹ Nuclear Physics Institute, Czech Academy of Science,
250 68 Řež, Czech Republic
jakubsky@ujf.cas.cz

Abstract

We present a two-dimensional model of spin-1/2 Dirac fermions in graphene subject to a tunable electric field, ranging from a uniform Lorentzian barrier to a chain of separated electrostatic scatterers. Through supersymmetric quantum mechanics, we reveal an exact connection to free-particle dynamics that naturally gives rise to omnidirectional (super-) Klein tunneling. The model further exhibits scale invariance and energy-dependent invisibility, with potential routes toward experimental implementation. The talk is based on [1] and [2].

References

- [1] Alonso Contreras-Astorga, Francisco Correa, Vit Jakubsky, Super-Klein tunneling of Dirac fermions through electrostatic gratings in graphene, Phys. Rev. B 102, 115429 (2020)
- [2] Alonso Contreras-Astorga, Francisco Correa, Luis Inzunza, Vit Jakubsky, Raul Valencia-Torres, Super-Klein tunneling in 2D Lorentzian-type barriers in graphene, arXiv:2603.20950 to appear in Phys. Rev. Res.