# Directionality emergence in 2D and 3D quantum random Lorentz gases

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The propagation of a spherical wave through a random Lorentz gas composed of small fixed scatterers is studied. Inspired by the Mott problem [1] (how an initially isotropic quantum wave can give rise to a single particle-like track), we investigate, on a schematic model, whether such a directional behavior can emerge purely from the multiscattering process, without any explicit measurement or decoherence mechanism. Using the Foldy-Lax formalism [2-4], we derive the far-field angular behavior of the wavefunction, and introduce a directionality vector to quantify its anisotropy and identify its preferred direction. In two dimensions [5], numerical simulations reveal the existence of a strongly directional regime within a specific wavenumber range. This behaviour emerges from multiscattering with more than $100$ scatterers and can be related to Anderson localization [6]. Preliminary results in three dimensions are also presented.

*This work was supported by the Belgian Fonds de la Recherche Scientifique - FNRS under IISN Grant No. 4.45.10.08. This research has also been supported by the ANR project MARS_light under reference ANR-19-CE30-0026, by the program "Investissements d'Avenir" launched by the French Government. It also received support from a grant of the Simons Foundation (No. 1027116).*

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