

Departmental Colloquium

Topological Insulators and obstruction to localization

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Abstract: Topological insulators (TIs) are materials characterized by topological invariants. One of their remarkable features is the asymmetric transport observed at the interface between materials in different topological phases. Such transport is itself described by a topological invariant, and therefore "protected" against random perturbations. This immunity makes TIs extremely promising for many engineering applications and actively researched.

In this talk, we present a PDE model for such TIs, introduce a topology based on indices of Fredholm operators, and analyze the influence of random perturbations. We confirm that topology is an obstruction to Anderson localization, a hallmark of wave propagation in strongly heterogeneous media in the topologically trivial case and to some extent quantify what is or is not protected topologically. For instance, a quantized amount of transmission is protected while back-scattering, a practical nuisance, is not.

Friday, November 9 at 3:00 PM in 636 SEO
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