

**Abstract for IAS Focused Program on Mathematical Foundations of Topological Materials
(January 6-9, 2026)**

Quantum Tunneling and Its Absence in Deep Wells and Strong Magnetic Fields

Michael I. Weinstein

Columbia University, USA

Email: miw2103@columbia.edu

In the absence of a magnetic field, a quantum particle always tunnels from one well into a neighboring well through a “classically forbidden” region at a rate which is the reciprocal of the “eigenvalue splitting”. Magnetic systems give rise to entirely new tunneling phenomena. We construct a family of double well potentials containing examples for which quantum tunneling is completely eliminated. On the other hand, magnetic tunneling does occur for ****typical**** double-well potentials, and we prove an upper bound on its tunneling rate. This is joint work with C.L. Fefferman and J. Shapiro.