Title: Quantum foundations and the marginal problem

Abstract: This talk tells the story of quantum nonlocality and contextuality in translation-invariant quantum many-body systems, and how it's related to the marginal problem. We will give a brief overview of nonlocality and contextuality, including its history and mathematical description. Then we will show how these kinds of problems can be related to finding the ground state energy of many-body Hamiltonians. We will use results from the marginal problem to solve the problem of characterizing local hidden variable models for 1D translation-invariant Hamiltonians. We will present the challenges of extending these results to two dimensions, including its connection with the tiling problem. We will conclude the talk with some open problems and a roadmap of future research.