

Abstract: "Non-colliding Ornstein-Uhlenbeck bridges and symmetry breaking in a quantum 1D Coulomb system"

Jellium is a model where negatively charged electrons move in a uniform neutralizing background of positive charge. Eugene Wigner conjectured that at low density, the electrons should crystallize, i.e., form a periodic lattice. We prove that in dimension 1, in a quantum mechanics setup, this actually happens for all temperatures and densities, thereby extending low-density results by Brascamp and Lieb (1975) and classical results by Aizenman and Martin (1980). The proof uses the Feynman-Kac formula to map the quantum model to a system of non-colliding Ornstein-Uhlenbeck bridges, and then applies the Krein-Rutman theorem (an infinite-dimensional version of Perron-Frobenius). The talk is based on joint work with Paul Jung (University of Alabama at Birmingham).