Measurement and control of Coulomb-blockaded parafermion box

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Parafermionic zero modes [1-3] are a fractional generalization of the well-known Majorana zero modes [4-6]. Similarly to Majoranas, a system of parafermions is predicted to have topologically protected ground state degeneracy, yet with a more intricate algebra of operators than that of Majoranas. Once implemented experimentally, both detecting parafermions and performing quantum manipulations with them would constitute an important challenge. In this talk I will discuss how employing Coulomb blockade effects in such a system allows one to design protocols for measurement and certain manipulations of the state of parafermions [7]. With these protocols, it is possible to confirm such crucial properties of the system as the dimension of the ground state subspace, degeneracy of the subspace, and the algebra of parafermionic operators.

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