Speaker: Barry C. Sanders
Title: Efficient quantum algorithms for simulating sparse Hamiltonians

Abstract:

We present an efficient quantum algorithm for simulating the evolution of a sparse Hamiltonian H for a given time t in terms of a procedure for computing the matrix entries of H. In particular, when H acts on n qubits, has at most a constant number of nonzero entries in each row/column, and |H| is bounded by a constant, we may select any positive integer k such that the simulation requires O((log^*n)t^{1+1/2k}) accesses to matrix entries of H. We show that the temporal scaling can not be significantly improved beyond this, because sublinear time scaling is not possible.