



復旦大學
FUDAN UNIVERSITY

Applied Math
Ph.D. Seminar

Resource Efficient Boolean Function Solver on Quantum Computer

Speaker: Xiang Li (Fudan University)

Time: 2024-12-05, 16:10 to 17:00

Location: Rm 1801, Guanghai East Tower

Advisor:

Weiguo Gao (Fudan University)

Yingzhou Li (Fudan University)

Abstract: Nonlinear boolean equation systems play an important role in a wide range of applications. Grover's algorithm is one of the best-known quantum search algorithms in solving the nonlinear boolean equation system on quantum computers. In this talk, we introduce several techniques to improve the efficiency in solving nonlinear boolean equations under Grover's algorithm framework. A W -cycle circuit construction introduces a recursive idea to increase the solvable number of boolean equations given a fixed number of qubits. Then, a greedy compression technique is proposed to reduce the oracle circuit depth. Finally, a randomized Grover's algorithm randomly chooses a subset of equations to form a random oracle every iteration, which further reduces the circuit depth and the number of ancilla qubits. Numerical results on boolean quadratic equations demonstrate the efficiency of the proposed techniques.