Quantum Computing
Phys 419/Phys 575, Autumn 2021
Instructor: Boris Blinov

Syllabus:

Week 1: Brief review of quantum mechanics; qubits and their representations.

Week 2: Entanglement.

Week 3: Quantum logic gates.

Week 4: Quantum computing architectures.

Week 5: Quantum algorithms. Exam 1.

Week 6: Physical realizations of qubits.

Week 7: Quantum information.

Week 8: Cryptography, quantum key distribution; teleportation.

Week 9: Single photons, EPR pairs.

Week 10: Error correction, fault tolerance. Exam 2.

Prerequisites: Phys 225 and Phys 227.

Textbook: "A Short Introduction to Quantum Information and Quantum Computation" by M. Le Bellac (Cambridge University Press, 2006). This is where most homework problems will come from.

Homework: Weekly, graded. Submitted online only, via Canvas dropbox. One late assignment (by no more than one week) will be accepted.

Exams: Two take-home, 24-hour exams, one in the middle and one at the end of the quarter. No make-up exams.

Course grade is 40% HW + 40% each exam = 120%.