



A SECOND COURSE IN THE QUANTUM THEORY OF INFORMATION AND COMPUTATION

Interdepartmental Reading Course suitable for research students in the Mathematical and Physical Science Division

Weeks 3-8, Trinity Term 2010 – first class Tuesday May 11, 2010

Tuesday and Thursday, 13-1400

Lecture Theatre B, ComLab

Assuming minimal prior background, our focus is to introduce the basic connections between information, computation, and condensed matter physics. In simple terms and by building on fully worked examples, those attending will be exposed to a higher mathematical language which will help bridge the gap between an introductory quantum information processing course and what's needed to read current literature. By unveiling common underlying structure and by providing a unifying notation and language, this course will follow the spirit of *Oxford Style Quantum Theory*.

There will be one practical in week 5 providing a hands on introduction to using Matlab to solve Schrodinger's wave equation

Topics include introductions to: Quantum Circuits as String Diagrams, Quantum Information, Hamiltonian and Lattice Models of Quantum Computation, Quantum Complexity Theory, Applications of Categories, Duality Transformations as String Diagrams, Variational Methods and Tensor Network States, Quantum Algorithms to Simulate Physics and Chemistry and Adiabatic Quantum Computation

Lectures by: Jacob Biamonte, Stephen Clark, Mark Williamson and Vlatko Vedral - Problems classes by: Shane Mansfield

For updated information: <http://www.comlab.ox.ac.uk/activities/quantum/course/>