

Boulder 2010 – detailed weekly program

All lectures are in Duane Physics G125.

Week 1, July 5-9

Tuesday, July 6th

9:00-10:30 **Matthias Troyer**

Introduction to (classical) Monte Carlo simulations

11:00-12:30 **Thomas Schulthess**

Introduction to high-performance computing and parallel programming

14:30-17:00 **student introduction**

Wednesday, July 7th

9:00-10:30 **Thomas Schulthess**

Introduction to high-performance computing and parallel programming

11:00-12:30 **Simon Trebst**

Extended ensemble simulations

14:30-16:00 **hands-on session**

Introduction to ALPS / Classical Monte Carlo (hands-on tutorial)

Thursday, July 8th

9:00-10:30 **Matthias Troyer**

Introduction to quantum Monte Carlo simulations

11:00-12:30 **Roger Melko**

Stochastic series expansion QMC

14:30-16:00 **Gil Refael**

(Dis)ordered bosons

Friday, July 9th

9:00-10:30 **Roger Melko**

Phase transitions and scaling in QMC

11:00-12:30 **Gil Refael**

(Dis)ordered bosons

14:30-16:00 **hands-on session**

Quantum Monte Carlo (hands-on tutorial)

Week 2, July 12-16

Monday, July 12th

9:00-10:30 **Matthias Troyer**

The sign problem in quantum Monte Carlo simulations

11:00-12:30 **Andreas Läuchli**

Exact diagonalization

14:30-16:00 **Steven White**

The density matrix renormalization group

Tuesday, July 13th

9:00-10:30 **Simon Trebst**

Linked-cluster series expansions

11:00-12:30 **Steven White**

The density matrix renormalization group

Wednesday, July 14th

9:00-10:30 **Ashvin Vishwanath**

Frustrated magnetism

11:00-12:30 **Matt Hastings**

Entanglement & computational complexity

14:30-16:00 **hands-on session**

Quantum Monte Carlo II (hands-on tutorial)

Thursday, July 15th

9:00-10:30 **Ashvin Vishwanath**

Frustrated magnetism

11:00-12:30 **Matt Hastings**

Entanglement & computational complexity

14:30-16:00 **Andreas Läuchli**

Exact diagonalization

Friday, July 16th

9:00-10:30 **Steven White**

The density matrix renormalization group

11:00-12:30 **hands-on session**

Exact Diagonalization (hands-on tutorial)

Week 3, July 19-23

Monday, July 19th

- 9:00-10:30 **Matthew Fisher**
*2D Bose and Non-Fermi Liquid "Metals":
Circumnavigating the Sign Problem*
- 11:00-12:30 **Adrian Feiguin**
Time-dependent DMRG
- 14:30-16:00 **David Huse**
Cold atoms

Tuesday, July 20th

- 9:00-10:30 **Matthew Fisher**
Gapless spin liquids in two dimensions
- 11:00-12:30 **Adrian Feiguin**
Equilibrium & non-equilibrium dynamics with DMRG: Applications
- 14:30-16:00 **David Huse**
Cold atoms

Wednesday, July 21th

- 9:00-10:30 **Bryan Clark**
Variational Monte Carlo
- 11:00-12:30 **Frank Verstraete**
Tensor network states and entanglement renormalization
- 14:30-16:00 **hands-on session**
The density matrix renormalization group (DMRG) (hands-on tutorial)

Thursday, July 22th

- 9:00-10:30 **Ashwin Nayak**
Quantum information and complexity
- 11:00-12:30 **Frank Verstraete**
Tensor network states and entanglement renormalization
- 14:30-16:00 **Bryan Clark**
Projection Monte Carlo and the Fixed Node Method

Friday, July 23th

- 9:00-10:30 **Frank Verstraete**
Tensor network states and entanglement renormalization
- 11:00-12:30 **Ashwin Nayak**
Quantum information and complexity

Week 4, July 26-30

Monday, July 26th

- 9:00-10:30 **Barbara Terhal**
Quantum information and complexity
- 11:00-12:30 **Andy Millis**
*Correlated Electron Compounds:
from real materials to model systems and back again I*
- 14:30-16:00 **Philipp Werner**
Quantum impurity solvers

Tuesday, July 27th

- 9:00-10:30 **Barbara Terhal**
Quantum information and complexity
- 11:00-12:30 **Andy Millis**
*Correlated Electron Compounds:
from real materials to model systems and back again II*
- 14:30-16:00 **hands-on session**
Dynamical mean field theory (DMFT) (hands-on tutorial)

Wednesday, July 28th

- 9:00-10:30 **Philipp Werner**
Quantum impurity solvers
- 11:00-12:30 **Andy Millis**
*Correlated Electron Compounds:
from real materials to model systems and back again III*
- 14:30-16:00 **Ulrich Schollwoeck**
DMRG for quantum impurity problems

Thursday, July 29th

- 9:00-10:30 **Patrick Lee**
Fermions & spin liquids
- 11:00-12:30 **Ulrich Schollwoeck**
Tensor product states [cont'd from Frank Verstraete]

Friday, July 30th

- 9:00-10:30 **Patrick Lee**
Fermions & spin liquids
- 11:00-12:30 **round-up**