

Dynamics of Strongly Correlated Electrons June 30-July 25, 2025

Detailed Schedule All lectures are in Duane Physics Room G130

Unless otherwise noted lunches are held at the Alfred-Packard Grill and dinners at WVCC Dining Hall

Week 1, June 30-July 4, 2025

Sunday, June 29th

18:30 – 20:30 **Registration mixer with refreshments**
11th floor, Gamow Tower Common Room

Monday, June 30th

8:30 – 9:00 **Organizers**
Welcome and School Introduction

Session Chair: D. Chowdhury

9:00 – 10:30 **D. Maslov**
Transport in correlated electron systems: Fermi liquid and beyond

10:30 – 11:00 Coffee break – questions / interaction with speaker

11:00 – 12:30 **T. Senthil**
The landscape of quantum matter

12:30 – 13:45 Lunch

Session Chair: D. Chowdhury

14:00 – 15:30 **S. Kivelson**
Progress in understanding the essential physics of the cuprate high temperature superconductors

15:30 – 17:00 **Participant Introductions**

17:00 – 18:30 Dinner *At Farrand Dining Hall

18:30 – 18:55 **Poster Blurbs I**
Duane G130

19:00 – 22:00 **Poster Session I**
11th Floor Commons Room, Gamow Tower

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Tuesday, July 1st

Session Chair: D. Chowdhury

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|-----------------------------|--|
| 9:00 – 10:30 | D. Maslov
<i>Transport in correlated electron systems: Fermi liquid and beyond</i> |
| 10:30 – 11:00 | Coffee break |
| 11:00 – 12:30 | P. Armitage
<i>Optics for quantum materials</i> |
| 12:30 – 13:45 | Lunch |
| Session Chair: D. Chowdhury | |
| 14:00 – 15:30 | S. Kivelson
<i>Progress in understanding the essential physics of the cuprate
high temperature superconductors</i> |
| 18:00 – 20:30 | Dessert on Flagstaff Mountain
Buses leave Williams Village at 6pm |

Wednesday, July 2nd

Session Chair: D. Chowdhury

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|-------------------------|--|
| 9:00 – 10:30 | T. Senthil
<i>How might a Fermi surface die?</i> |
| 10:30 – 11:00 | Coffee break |
| 11:00 – 12:30 | P. Armitage
<i>Nonlinear optics for quantum materials</i> |
| 12:30 – 13:45 | Lunch |
| Session Chair: A. Lucas | |
| 14:00 – 15:30 | D. Maslov
<i>Transport in correlated electron systems: Fermi liquid and beyond</i> |

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Thursday, July 3rd

Session Chair: L Radzihovsky

9:00 – 10:30

D. Maslov

Transport in correlated electron systems: Fermi liquid and beyond

10:30 – 11:00

Coffee break

11:00 – 12:30

S. Kivelson

Progress in understanding the essential physics of the cuprate high temperature superconductors

12:30 – 13:45

Lunch

Session Chair: M. Lee

14:00 – 15:30

P. Armitage

Quantum optics for quantum materials

Friday, July 4th

Session Chair: M. Lee

9:00 – 10:30

T. Senthil

Anyonic quantum matter

10:30 – 11:00

Coffee Break

Session Chair: L. Radzihovsky

11:00 – 12:30

What have we learned this week?

12:30 – 13:45

Lunch **At Farrand Dining Hall*

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Week 2, July 7 – 11, 2025

Monday, July 7th

Session Chair: A. Lucas

9:00 – 10:30

A. Chubukov

Unconventional Superconductivity

10:30 – 11:00

Coffee break – questions / interaction with speaker

11:00 – 12:30

M. Murnane

Putting Attosecond high harmonic sources to work for probing strongly correlated electronic systems

12:30 – 13:45

Lunch

Session Chair: M. Lee

14:00 – 15:30

P. Kim

Electric, thermal and thermoelectric transport measurement in the mesoscopic quantum materials

17:00 – 18:30

Dinner *At Alfred Packer Grill

Poster Session Chair: A. Lucas

18:30 – 18:55

Poster Blurbs II

Duane G130

19:00 – 22:00

Poster Session II

11th Floor Commons Room, Gamow Tower

Tuesday, July 8th

Session Chair: A. Lucas

9:00 – 10:30

M. Murnane

Ultrafast spin transfer and spin textures probed using extreme UV light

10:30 – 11:00

Coffee break – questions / interaction with speaker

11:00 – 12:30

A. MacDonald

Moire Materials

12:30 – 13:45

Lunch

Session Chair: M. Lee

14:00 – 15:30

P. Kim

AC transport measurement in flat band systems

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Wednesday, July 9th

Session Chair: A. Lucas

9:00 – 10:30

P. Kim

Coherence and correlation measurement in the van der Waals heterostructure

10:30 – 11:00

Coffee break – questions / interaction with speaker

11:00 – 12:30

A. Chubukov

Unconventional Superconductivity

12:30 – 13:45

Lunch

Session Chair: L. Radzihovsky

14:00 – 15:30

A. MacDonald

Moire Materials

Thursday, July 10th

Session Chair: L. Radzihovsky

9:00 – 10:30

A. Chubukov

Unconventional Superconductivity

10:30 – 11:00

Coffee break – questions / interaction with speaker

11:00 – 12:30

A. MacDonald

Moire Materials

12:30 – 13:45

Lunch

Session Chair: M. Lee

14:00 – 15:30

A. Chubukov

Unconventional Superconductivity

Friday, July 11th

Session Chair: M. Lee

9:00 – 10:30

M. Murnane

Attosecond ARPES: Revealing the many-body interactions underlying ground state orders

10:30 – 11:00

Coffee break – questions / interaction with speaker

11:00 – 12:30

A. MacDonald

Moire Materials

12:30 – 13:45

Lunch

Session Chair: L. Radzihovsky

14:00 – 15:30

What have we learned this week?

19:00 – 22:00

Catered Dinner

**1st Floor Commons Room, Gamow Tower*

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Week 3, July 14 – 18, 2025

Monday, July 14th

Session Chair: D. Chowdhury

9:00 – 10:30

S. Sachdev

From a critical quantum spin liquid to the phase diagram of the cuprate high temperature superconductors: Parton theory of spin liquids on the square lattice

10:30 – 11:00

Coffee break – questions / interaction with speaker

11:00 – 12:30

L. Delacretaz

(Slightly) Out-of-equilibrium dynamics in correlated matter: Hydrodynamic EFTs and transport bounds: Thermal Dynamics

12:30 – 13:45

Lunch

Session Chair: D. Chowdhury

14:00 – 15:30

L. Levitov

Electron fluids

Tuesday, July 15th

Session Chair: D. Chowdhury

9:00 – 10:30

S. Sachdev

From a critical quantum spin liquid to the phase diagram of the cuprate high temperature superconductors: Confinement of the pi-flux spin liquid, and d-wave superconductivity

10:30 – 11:00

Coffee Break

11:00 – 12:30

L. Delacretaz

(Slightly) Out-of-equilibrium dynamics in correlated matter: Hydrodynamic EFTs and transport bounds: Modern EFTs for Fluctuating Hydrodynamics

12:30 – 13:45

Lunch

Session Chair: A. Lucas

14:00 – 15:30

D. Chowdhury

Constraints on transport and superconductivity in quantum matter

17:00 – 18:30

Dinner *At Alfred Packer Grill

Session Chair: M. Lee

18:30 – 18:55

Poster Blurbs III

Duane G130

19:00 – 22:00

Poster Session III

11th Floor Commons Room, Gamow Tower

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Wednesday, July 16th

Session Chair: D. Chowdhury

9:00 – 10:30

L. Delacretaz

*(Slightly) Out-of-equilibrium dynamics in correlated matter:
Hydrodynamic EFTs and transport bounds: Bounds on Transport*

10:30 – 11:00

Coffee Break

14:00 – 15:30

D. Chowdhury

*Fundamental upper bounds on superconducting transition
temperatures*

12:30 – 13:45

Lunch

Session Chair: M. Lee

14:00 – 15:30

L. Levitov

Electron fluids

17:00 – 18:30

Dinner **At Alfred Packer Grill*

19:00 – 21:00

Public Lecture: M. Murnane

*Building the Quantum Microscopes of the Future: from Star Wars
to quantum sculpting, Duane Physics, G1B20*

Thursday, July 17th

Session Chair: L. Radzihovsky

9:00 – 10:30

S. Sachdev

*From a critical quantum spin liquid to the phase diagram of the
cuprate high temperature superconductors: Fractionalized Fermi
liquids (FL*) in Kondo lattice and single band models*

10:30 – 11:00

Coffee Break

11:00 – 12:30

L. Levitov

Electron fluids

12:30 – 13:45

Lunch

Session Chair: L. Radzihovsky

14:00 – 15:30

D. Dessau

ARPES

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Friday, July 18th

Session Chair: M. Lee

9:00 – 10:30

S. Sachdev

From a critical quantum spin liquid to the phase diagram of the cuprate high temperature superconductors: SYK models and strange metals

10:30 – 11:00

Coffee Break

11:00 – 12:30

M. Lee

A short review of thermal transport experiments on magnetic insulators

12:30 – 13:45

Lunch

Session Chair: L. Radzihovsky

14:00 – 15:30

What have we learned this week?

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Week 4, July 21 - July 25, 2025

Monday, July 21st

Session Chair: A. Lucas

9:00 – 10:30

U. Mehta

High-dimensional Bosonization

10:30 – 11:00

Coffee break – questions / interaction with speaker

11:00 – 12:30

F. Pollmann

Introduction to Tensor Networks

12:30 – 13:45

Lunch

Session Chair: M. Lee

14:00 – 15:30

A. Lucas

How to build an ordered phase at arbitrarily high temperature

Tuesday, July 22nd

Session Chair: M. Lee

9:00 – 10:30

A. Lucas

How to build an ordered phase at arbitrarily high temperature

10:30 – 11:00

Coffee Break

11:00 – 12:30

F. Pollmann

Basic Algorithms: TEBD and DMRG

12:30 – 13:45

Lunch

Session Chair: M. Lee

14:00 – 15:30

M. Hermele

Beyond spin liquids: fracton quantum matter

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Wednesday, July 23rd

Session Chair: A. Lucas

9:00 – 10:30	J. Shan <i>Optical spectroscopy of 2D materials</i>
10:30 – 11:00	Coffee Break
11:00 – 12:30	F. Pollmann <i>Simulation of Quantum Many-Body Dynamics</i>
12:30 – 13:45	Lunch
Session Chair: L. Radzihovsky	
14:00 – 15:30	M. Hermele <i>Beyond spin liquids: fracton quantum matter</i>

Thursday, July 24th

Session Chair: M. Lee

9:00 – 10:30	J. Shan <i>Optical sensing of correlated and topological states in 2D</i>
10:30 – 11:00	Coffee Break
11:00 – 12:30	F. Pollmann <i>Tensor Network inspired Quantum Algorithms</i>
12:30 – 13:45	Lunch

Friday, July 25th

Session Chair: M. Lee

9:00 – 10:30	J. Shan <i>Towards high temperature exciton condensation in 2D atomic double layers</i>
10:30 – 11:00	Coffee Break
Session Chair: A. Lucas	
11:00 – 12:30	What have we learned this month?
12:30 – 13:45	Lunch