

Emerging Phenomena in the Strong Light-Matter Coupling Regime

Telluride Workshop, June 10-14, 2024

Organizer: Jianshu Cao

TSRC hosts: Mark Kozak (970) 708-4426, Cindy Fusting (970) 708-5069

Meeting location: Telluride Intermediate School at 721 W. Colorado Ave.

Sunday, June 9:

**5:00-6:30 pm: All-Telluride Science Meet and Greet informal gathering and registration,
Alibi, 157 S. Fir Street.**

June 10th (Monday), Day 1

7:30 am-8:15 am **Breakfast At The Center**

MORNING SESSIONS (Chair: Aaron Rury; Topic: Emerging Phenomena)

8:15 am-8:30 am **Opening Remarks**

8:30 am-9:10 am **Norbert Scherer, University of Chicago**
N-body interactions and light scattering-associated "non-reciprocal" forces in and on optical matter systems

9:10 am-9:50 am **Ignacio Franco, University of Rochester**
Floquet theory and computation of the optical properties of laser-dressed materials

9:50 am-10:10 am **Coffee Break**

10:10 am-10:50 am **Nathaniel Stern, Northwestern University**
New Dimensions on the Interaction of Light and Matter: Polaritonic Control in Nanomaterials and Molecules

10:50 am-11:30 pm **Roel Tempelaar, Northwestern University**
Bridging chiroptics and spintronics with strong light-matter coupling

11:30 pm-2:30 pm **Lunch Break**

AFTERNOON SESSIONS (Chair: Adam Dunkelberger; Topic: Vibrational Coupling)

2:30 pm-3:10 pm **Blake Simpkins, Naval Research Lab**
Measurement Artifacts under VSC: Knowing is Half the Battle

3:10 pm-3:50pm **Frank Huo, University of Rochester**
Theory of Resonant Suppression in Vibrational Polariton Chemistry

3:50 pm-4:10 pm **Coffee Break**

4:10 pm-4:50 pm **Lev Chuntonov, Israel Institute of Technology**
Infrared Spectroscopy of vibrational polaritons

4:50 pm-5:30 pm **Raphael Riberio, Emory University**
Chemical equilibrium and thermal radiative dissociation in microcavities

June 11th (Tuesday), Day 2

7:30 am-8:30 am **Breakfast At The Center**

MORNING SESSIONS (Chair: Andrew Musser; Topic: Transport)

8:30 am-9:10 am **Tal Schwartz, Tel Aviv University**
Delocalization and transport under strong coupling

9:10 am-9:50 am **Jianshu Cao, Massachusetts Institute of Technology**
Polariton Transport under Disorder and Noise

9:50 am-10:10 am **Coffee Break**

10:10 am-10:50 am **Libai Huang, Purdue University**
Polariton transport and interactions imaged by ultrafast microscopy

10:50 am-11:30 pm **Milan Delor, Columbia University**
Polariton transport under static and dynamic disorder

11:30 pm-2:30 pm **Lunch Break**

AFTERNOON SESSIONS (Chair: Ignacio Franco; Topic: Emerging Phenomena)

2:30 pm-3:10 pm **Hossein Sadeghpour, ITAMP, Harvard University**
Cavity induced collective dynamics: can photons anti-bunch?

3:10 pm-3:50pm **Benjamin Sussman, National Research Council Canada**
Ultrafast Quantum Photonics: Quantum Technologies with Short Pulses

3:50 pm-4:10 pm **Coffee Break**

4:10 pm-4:50 pm **Maxim Sukharev, Arizona State University**
Building quantitative understanding of optics at nanoscale interfaces

4:50 pm-5:30 pm **Kuniyuki Miwa, Institute for Molecular Science**
Control and enhancement of single-molecule electroluminescence through strong light-matter coupling

6:30pm **Telluride Town Talk (Telluride Conference Center, Mountain Village)**

June 12th (Wednesday), Day 3

8:30 am-12:00 am Free Time

12:00 pm-2:00 pm Lunch Break

AFTERNOON SESSIONS (Chair: Frank Huo; Topic: Electronic Coupling)

2:00 pm-2:40 pm Eric Bittner, University of Houston
Dark excitons and dark polaritons in hybrid perovskites

2:40 pm-3:20pm Carlos Silva, University of Montral
Dark excitons and dark polaritons in hybrid perovskites

3:20 pm-3:40 pm Coffee Break

3:40 pm-4:20 pm Joel Yuen Zhou, University of California San Diego
Building Finite size corrections to classical optics

4:20 pm-5:00 pm Javier Cerrillo-Moreno, Universidad Politécnica de Cartagena
Relaxation and Disorder of Lossy Cavity Polaritons: Transfer Tensor Method

5:30 pm-8:00 pm TSRC BBQ

June 13th (Thursday), Day 4

7:30 am-8:30 am **Breakfast At The Center**

MORNING SESSIONS (Chair: Raphael Riberio; Topic: Vibrational Coupling)

8:30 am-9:10 am **Gerrit Groenhof, University of Jyväskylä**
Can we control chemistry with a cavity? Insights from semi-classical molecular dynamics simulations

9:10 am-9:50 am **Adam Dunkelberger, U. S. Naval Research Laboratory**
Transient studies of vibration-cavity polaritons

9:50 am-10:10 am **Coffee Break**

10:10 am-10:50 am **Oriol Vendrell, Univeristy of Heidelberg, Germany**
Molecular Polaritonics in the Strong Light-Matter Coupling Regime

10:50 am-11:30 pm **Ashley Fidler, Princeton University**
Elementary solution phase biomolecular reaction dynamics under vibrational strong coupling

11:30 pm-2:30 pm **Lunch Break**

AFTERNOON SESSIONS (Chair: Milan Delor; Electronic Coupling)

2:30 pm-3:10 pm **Sergei Tretiak, Los Alamos National Lab**
Probing chemical dynamics in organic chromophores: from X-ray spectroscopies to strong light-matter interactions

3:10 pm-3:50pm **Aaron Rury, Wayne State University**
Assessing the Determinants of Cavity Polariton Relaxation Using Angle-Resolved Photoluminescence Excitation Spectroscopy

3:50 pm-4:10 pm **Coffee Break**

4:10 pm-4:50 pm **Andrew Musser, Cornell University**
Disorder & Darkness: Developing the toolkit for enhanced polariton condensation

4:50 pm-5:30 pm **Yu Zhang, Los Alamos National Labs**
First-Principles Quantum Electrodynamics Methods for Polaritonic Chemistry

June 14th (Friday), Day 5

7:30 am-8:30 am **Breakfast at The Center**

MORNING SESSIONS (Chair: Javier Cerrillo-Moreno; Topic: Emerging Phenomena)

8:30 am-9:10 am **Jussi Toppari, University of Jyväskylä**
Ultra-fast photochemistry under strong light-matter coupling

9:10 am-9:50 am **Vasil Rokaj, ITAMP, Harvard University**
Cavity Control of Topological Condensed Matter

9:50 am-10:10 am **Coffee Break**

10:10 am-10:50 am **Paul Brumer, University of Toronto**
Laboratory Science and Nature: Conceptual Considerations

10:50 pm-11:30 pm **General Discussion**