

Princeton-TAMU Summer School on Quantum Physics

Casper College, Casper, Wyoming, July 17-28, 2023

Sunday, July 16, 2023

3:00 PM: Snack food is being delivered to the Residence Hall kitchen (1st floor, Room 144)

6:00 PM: Dinner is set in the Residence Hall kitchen (1st floor) and stored in fridge for late arrivals

Monday, July 17, 2023

All Talks will be in the Wold Physical Science Center, Room 103 (PS103)

7:00 – 8:00 AM	BREAKFAST	Tobin Cafeteria on bottom floor of Union/University (UU building)
PS103 Session chair: Vlad Yakovlev		
8:10 – 8:20 AM	Marlan Scully, <i>Quantum Camp & Symposium</i>	Overview and Welcome
8:20 – 8:30 AM	Darren Divine, <i>Casper College</i>	
8:30 – 8:40 AM	Szymon Suckewer, <i>Princeton</i>	
8:40 – 8:50 AM	John Junkins, <i>TAMU</i>	
8:50 – 9:00 AM	BREAK	
9:00 – 9:40 AM	Aart Verhoef, <i>TAMU</i>	Multiphoton super-resolution microscopy
9:40 – 10:20 AM	Alexei Sokolov, <i>TAMU</i>	Quantum Sensing in Biophotonics
10:20 – 10:50 AM	BREAK	
Session chair: Aart Verhoef		
10:50 – 11:30 AM	Vlad Yakovlev, <i>TAMU</i>	Brillouin microscopy: seeing life in a new light
11:30 – 12:10 PM	Jifa Tian <i>University of Wyoming</i>	Two-dimensional topological superconductors for future fault-tolerant quantum computing
12:10 PM	LUNCH	Tobin Cafeteria (bottom floor UU Bldg.)
Afternoon recreational activities		
6:15 – 7:00 PM	DINNER	Outside PS 103
PS103 Session chair: TeYu Chien		
7:00 – 7:40 PM	Zhenhuan Yi, <i>TAMU</i>	Atomic coherence, cooperative emission and some applications
7:40 – 8:00 PM	Jizhou Wang, <i>TAMU</i>	Label-free wide-field imaging with high spatial resolution enabled by infrared-resonant third-order sum-frequency technique
8:00 – 8:30 PM	POSTER SESSION / BREAK	
8:30 – 8:55 PM	Suyash Bajpai <i>Howard University</i>	Rabi sideband emission from excitation gratings in filament wake channels in a dense argon gas
8:55 – 9:20 PM	Reed Nessler, <i>TAMU</i>	Jittering the photon distribution

[Link to Book of Abstracts](#)



Tuesday, July 18, 2023

7:00 – 8:00 AM	BREAKFAST	Tobin Cafeteria
PS103 Session chair: Jifa Tian		
8:10 – 8:50 AM	Rafael Quintero-Torres <i>CAPAT</i>	Laser-induced thermal profile in liquids and self-induced diffraction patterns
8:50 – 9:30 AM	Jinke Tang <i>University of Wyoming</i>	Investigation of the thermal transport and magnetic properties of potential quantum materials
9:30 – 10:10 AM	TeYu Chien <i>University of Wyoming</i>	Manipulating physical properties toward quantum information application through phase control and Moiré patterns in mixed phase 2M-2H WS ₂
10:10 – 10:40 AM	POSTER SESSION / BREAK	
Session chair: Yusef Maleki		
10:40 – 11:20 AM	Norbert Kroo <i>Wigner Research Center</i>	Medium high field plasmonics and one of its special applications
11:20 – 12:00 PM	Zhenrong Zhang, <i>Baylor</i>	Laser-printed plasmonic structural coloration on TiN substrate
12:00 PM	LUNCH	Tobin Cafeteria
Afternoon recreational activities		
6:15 – 7:00 PM	DINNER	Outside PS 103
PS103 Session chair: Bob Brick		
7:00 – 8:00 PM	Poster Presentations	Posters 1-11
8:00 – 8:30 PM	POSTER SESSION / BREAK	
8:30 – 9:30 PM	Poster Presentations	Posters 12-21

Wednesday, July 19, 2023

7:00 – 8:00 AM	BREAKFAST	Tobin Cafeteria
PS103 Session chair: Rafael Quintero-Torres		
8:10 – 8:50 AM	Dawei Wang, <i>Zhejiang University</i>	Quantum induced coherence light detection and ranging
8:50 – 9:20 AM	Debsuvra Mukhopadhyay <i>Washington University St. Louis</i>	Quantum Multiphoton Rabi Oscillations in Waveguide QED
9:20 – 9:45 AM	Qihang Liu, Washington University in St. Louis	Coherent States of Photonic Dimers
9:45 – 10:05 AM	Rohil Kayastha, <i>Baylor</i>	Characterization of optical vortex beam in free space and optical fiber
10:05 – 10:35 AM	POSTER SESSION / BREAK	
Session chair: Zhenrong Zhang		
10:35 – 11:15 AM	Yusef Maleki, <i>TAMU</i>	Quantum network sensors and distributed phase estimation metrology
11:15 – 11:45 AM	Muzzamal Iqbal Shaukat <i>Univ. of Texas at Dallas</i>	Dark Soliton Qudits: A Novel Quantum Information Platform
11:45 – 12:00 PM	Sijmon Verhoef <i>Wildwood Secondary</i>	Radio Waves in World War II
12:00 PM	LUNCH	Tobin Cafeteria
Afternoon recreational activities		
6:15 – 7:00 PM	DINNER	Outside PS 103
PS103		
7:00 – 7:40 PM	Marcelo Terra Cunha, <i>Unicamp</i>	The Hardy argument for quantum contextuality
7:40 – 8:30 PM	Robert Nevels, <i>TAMU</i>	Radio and the Science of Wireless Transmission
8:30 – 8:50 PM	POSTER SESSION / BREAK	
8:50 – 9:30 PM	Aart Verhoef & Alma Fernandez <i>TAMU</i>	Identification of molecules using Raman spectrometer

Thursday, July 20, 2023

7:00 – 8:00 AM	BREAKFAST	Tobin Cafeteria
PS103 Session chair: Marcelo Terra Cunha		
8:10 – 8:50 AM	Shiyao Zhu & Dawei Wang <i>Zhejiang University</i>	From quantum interference to quantum simulation
8:50 – 9:30 AM	Philip Kurian <i>Howard University</i>	Quantum optical mega-networks in biological architectures
9:30 – 10:10 AM	Kaden Hazzard, <i>Rice</i>	Programmable Ultracold Quantum Matter
10:10 – 10:40 AM	POSTER SESSION / BREAK	
Session chair: Kaden Hazzard		
10:40 – 11:20 AM	Anatoly Svidzinsky, <i>TAMU</i>	Noise induced coherence, vacuum entanglement, and efficiency of quantum heat engines
11:20 – 12:00 PM	Arash Azizi, <i>TAMU</i>	Kappa vacua: Enhancing the Unruh temperature
12:00 PM	LUNCH	Tobin Cafeteria
Afternoon recreational activities		
6:15 – 7:00 PM	DINNER	Outside PS 103

5:00 PM, Dinner, Hamburgers & hot Dogs, Gateway Center (GW) 221/225

6:00 PM, After-dinner entertainment (moderators: Ming-Hsun Chou, Richard Sprague, Jiru Liu)

Friday, July 21, 2023

7:00 – 8:00 AM	BREAKFAST	Tobin Cafeteria
PS103 Session chair: Marlan Scully		
8:10 – 8:50 AM	Gary Eden <i>University of Illinois</i>	Fractal laser modes, speckle-free optical imaging, water optics, and other fascinating topics in optical physics and engineering (Zoom)
8:50 – 9:30 AM	Carmen Menoni <i>Colorado State University</i>	Bright extreme ultraviolet laser sources and their applications (Zoom)
9:30 – 10:10 AM	Jorge Rocca <i>Colorado State University</i>	Relativistic nanophotonics: creating extreme plasma and fields with ultra-intense, ultrafast lasers (Zoom)
10:10 – 10:40 AM	POSTER SESSION / BREAK	
Session chair: Zhenhuan Yi		
10:40 – 11:20 AM	Norbert Kroo <i>Wigner Research Center</i>	High field plasmonics and potential nanoplasmonic laser fusion
11:20 – 12:00 PM	Zhedong Zhang, <i>City University of Hong Kong</i>	Monitoring electronic coherence of molecules by quantum-light spectroscopy (Zoom)
12:00 PM	LUNCH	Tobin Cafeteria
Afternoon recreational activities		
6:15 – 7:00 PM	DINNER	Outside PS 103
PS103		
7:00 – 7:50 PM	Ed Fry, <i>TAMU</i>	Recent Nobel Prize and the Bell Inequality
7:50 – 8:20 PM	POSTER SESSION / BREAK	
8:20 – 9:10 PM	Hamza Patwa <i>Howard University</i>	Quantum Gravity: An Introduction

Saturday, July 22, 2023

Sunday, July 23, 2023

8:00 – 9:00 AM	BREAKFAST	Dorm kitchen
12:00 PM	LUNCH	Dorm kitchen
July 22, 5:00 PM Barbecue on the yard (under pavilion tent outside Tobin Cafeteria)	July 23, 6:00 PM Dinner, Dorm kitchen	

Monday, July 24, 2023

7:00 – 8:00 AM	BREAKFAST	Tobin Cafeteria (bottom floor UU Bldg.)
PS103 Session chair: Dawei Wang		
8:10 – 8:50 AM	Wolfgang Schleich <i>Universität Ulm</i>	The wave functional of the vacuum in a resonator
8:50 – 9:30 AM	Yanhua Shih <i>University of Maryland</i>	Nonlocal interference of photon pair at distance
9:30 – 10:10 AM	Truell Hyde, <i>Baylor</i>	Complex Plasma
10:10 – 10:40 AM	POSTER SESSION / BREAK	
Session chair: Truell Hyde		
10:40 – 11:20 AM	Dmitri Voronine <i>Univ. of South Florida</i>	Raman autopsy of cancer cells
11:20 – 12:00 PM	Cleo Bentley, <i>Prairie View A&M University</i>	The Lithium atom fine structure energy levels from electron average-path elliptical orbits and spin
12:00 PM	LUNCH	Tobin Cafeteria (bottom floor UU Bldg.)
Afternoon recreational activities		
6:15 – 7:00 PM	DINNER	Outside PS 103
PS103 Session chair: Philip Kurian		
7:00 – 7:40 PM	Muriel Medard, <i>MIT</i>	An introduction to Forward Error Correction and Guessing Random Additive Noise Decoding
7:40 – 8:20 PM	Ken Duffy <i>Northeastern University</i>	Leveraging channel knowledge with GRAND – ORBGRAND-AI
8:20 – 8:50 PM	POSTER SESSION / BREAK	

Tuesday, July 25, 2023

7:00 – 8:00 AM	BREAKFAST	Tobin Cafeteria
PS103		
8:10 – 9:50 AM	Suhail Zubairy, <i>TAMU</i>	Quantum communication with invisible photons
9:50 – 10:20 AM	POSTER SESSION / BREAK	
PS103 Session chair: Dmitri Voronine		
10:20 – 11:00 AM	Olga Kocharovskaya, <i>TAMU</i>	Coherent control of ultra-narrow nuclear transitions
11:00 – 11:40 AM	Yury Shvyd'ko, <i>Argonne National Laboratory</i>	Resonant X-ray excitation of the long-lived ultra-narrow nuclear isomeric state in ⁴⁵ Sc
11:40 – 12:00 PM	Xiwen Zhang, <i>TAMU</i>	Nuclear quantum memory for hard X-ray photons
12:00 PM	LUNCH	Tobin Cafeteria
Afternoon recreational activities		
6:15 – 7:00 PM	DINNER	Outside PS 103
PS103		
7:00 – 7:50 PM	Roland Allen, <i>TAMU</i>	The deepest mysteries of our quantum universe
7:50 – 8:20 PM	POSTER SESSION / BREAK	
8:20 – 9:10 PM	Philip Kurian <i>Howard University</i>	Computational Capacity of Life and the Observable Universe

Wednesday, July 26, 2023

7:00 – 8:00 AM	BREAKFAST	Tobin Cafeteria
PS103 Session chair: Arash Azizi		
8:10 – 8:50 AM	Marlan Scully, <i>TAMU</i>	Entanglement in Unruh and Hawking radiation from a quantum optical perspective
8:50 – 9:30 AM	Robert Mann <i>University of Waterloo</i>	Quantum superpositions of black holes (Zoom)
9:30 – 10:10 AM	Eduardo Martin-Martinez <i>University of Waterloo</i>	When do quantum effects matter in the interface of gravity, quantum information and quantum optics? (Zoom)
10:10 – 10:40 AM	POSTER SESSION / BREAK	
PS103 Session chair: Carlos Ordonez		
10:40 – 11:20 AM	Bill Unruh, <i>Univ. of BC</i>	LIGO is Quantum (Zoom)
11:20 – 12:00 PM	Philip Stamp, <i>Univ. of BC</i>	Is the LIGO mirror a macroscopic quantum object? Current theory and future experiments (Zoom)
12:00 PM	LUNCH	Tobin Cafeteria
Afternoon recreational activities		

5:00 – 6:00 PM, Dinner, Tobin Cafeteria (bottom floor UU Bldg.)

7:00 PM (to be confirmed), Movie **“Oppenheimer”** (directed by Christopher Nolan)

Studio City Digital Cinemas, 5020 E. Second St., Casper

Thursday, July 27, 2023

7:00 – 8:00 AM	BREAKFAST	Tobin Cafeteria
PS103 Session chair: Wolfgang Schleich		
8:10 – 8:50 AM	Frank Narducci <i>Naval postgraduate school</i>	Novel atom interferometer
8:50 – 9:30 AM	Carlos Ordonez <i>University of Houston</i>	Quantum scaling anomalies in 2D and 1D systems
9:30 – 10:00 AM	POSTER SESSION / BREAK	
10:00 – 10:30 AM	Jonathan Ben-Benjamin <i>TAMU</i>	General relativity for the unwashed
10:30 – 11:20 AM	James Murray <i>Howard University</i>	From Plants and Photosynthesis to Solar Panels: A Quantum Biology Unit of Study for 4th and 5th Graders
11:20 – 12:10 PM	Suzy Lidström, <i>TAMU</i>	A quantum perspective on consciousness
12:10 PM	LUNCH	Tobin Cafeteria
Afternoon recreational activities		
6:15 – 7:00 PM	DINNER	Outside PS 103
PS103		
7:00 – 8:00 PM	Presentations by high-school students	
8:00 – 8:30 PM	POSTER SESSION / BREAK	
8:30 – 9:30 PM	Presentations by high-school students	

Friday, July 28, 2023

7:00 – 8:00 AM	BREAKFAST	Tobin Cafeteria
PS103	Session chair: Wenzhuo Zhang	
8:10 – 8:30 AM	Barnabas Kim, <i>TAMU</i>	What's next in quantum heat engines
8:30 – 9:10 AM	Nara Altangerel, <i>TAMU</i>	Sinclair pig as an animal model in both cancer and diet related research studies
9:10 – 9:30 AM	Alma Fernandez, <i>TAMU</i>	Study of nitrate uptake in roots with Raman microscopy
9:30 – 10:00 AM	POSTER SESSION / BREAK	
10:00 – 10:50 AM	Suzy Lidström and Roland Allen, <i>TAMU</i>	Quantum physics in medicine
10:50 – 11:40 AM	Alexei Sokolov, <i>TAMU</i>	Ultrafast Lasers and Quantum Sensing in Biophotonics
11:40 – 12:00 PM	Concluding remarks	
12:00 PM	LUNCH	Tobin Cafeteria
Afternoon recreational activities		

Friday evening, July 28, 2023

6:00 – 7:00 PM: Dinner, Tobin Cafeteria (bottom floor UU Bldg.)

8:00 PM: Snack food is being delivered to the Residence Hall kitchen (1st floor)

Saturday morning, July 29, 2023

5:30 AM Breakfast is set in the Residence Hall kitchen (1st floor)

Posters:

1. Sahar Delfan, TAMU, *Biosensor design and fabrication*
2. Zhi Gao, TAMU, *High-spatially resolved probing local field distribution of optical antennas for enhancing OAM Light*
3. Guillermo Gonzalez, University of Texas at San Antonio, *Quantum edge detection*
4. Ayla Hazrathosseini, TAMU, *Taking Upconversion to Lase in Microcavity*
5. Tuo Jia, TAMU, *Aspects of Hawking temperature*
6. Zhenfei Jiang, TAMU, *Applications of quantum light sources in bioimaging*
7. Yiyun Li, TAMU, *Optical multiband polarimetric modulation sensing for the identification of gender and species of native solitary pollinators in flight*
8. Ankang Liu, TAMU, *Manifestation of magnon vacuum entanglement*
9. Jiru Liu, TAMU, *Conservation of Gaussian states nonclassicality in linear optical networks*
10. Pablo Lopez-Duque, University of Houston, *Entanglement in bipartite systems involving finite-lifetime observers*
11. Hamza Patwa, Howard University, *Single photon superradiance and radiation trapping: Comparison of analytical, discrete, and numerical approaches for the cylindrical case*
12. Riva Salzman, TAMU, *High resolution imaging of soil aggregate pore space and microbial activity using optical coherence and multiphoton microscopy*
13. Yanli Shi, TAMU, *Origin of the transparency resonances in ensemble of germanium vacancy centers*
14. Nusrat Zahan Tanwee, Baylor, *Photoreaction studies with photoluminescence ghost imaging: Leveraging structured light and benefits of ghost imaging*
15. Sanjib Thapa, Baylor, *Plasmonic resonance measurement of metals and transparent conducting films using the Kretschmann configuration*
16. Sijmon Verhoef, Wildwood Secondary, *Radio waves in World War II*
17. Charles Wallace, TAMU, *Weak coherent state localization*
18. Xingqi Xu, Zhejiang University, *Floquet Superradiance Lattices in Room-Temperature Atoms*
19. Fan Yang, TAMU, *Whispering gallery modes in a wormhole*
20. Chaofan Zhou, TAMU, *Decay of single photon in cavity with atomic mirrors*
21. Wenzhuo Zhang, TAMU and Zia Harrison, Furman University, *Atom response to quantum chaos of a black hole*

Summer School is organized by:

Bob Brick, Marlan Scully, Anatoly Svidzinsky, Zhenhuan Yi