TAMU-Princeton-Casper-Baylor-CSU-UIUC Summer School

"From Laser fusion to Quantum physics and Gravity"

Casper College, Casper, Wyoming, July 21-25, 2025

Sunday, July 20, 2025

3:00 PM: Snack food is being delivered to Residence Hall kitchens 352, 244 or 192

6:00 PM: Dinner is set in Residence Hall kitchens 352, 244 or 192 and stored in fridge for late arrivals

Monday, July 21, 2025

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		
8:10 – 8:40 AM	Marlan Scully, *Quantum Camp & Symposium* Brandon Kosine, *President of Casper College* *Representative of Casper College Board of Trustees*	**Overview and Welcome**
8:40 – 9:10 AM	Siegfried Glenzer, *SLAC/Stanford,* The quest for high fusion gain	
9:10 – 9:20 AM	BREAK	
Session chair: Alexei Sokolov		
9:20 – 9:50 AM	Carmen Menoni *Colorado State University*	
9:50 – 10:20 AM	Jorge Rocca *Colorado State university*	
10:20 – 10:50 AM	BREAK	
Session chair: Jorge Rocca		
10:50 – 11:20 AM	Kavita Kabelitz, *UIUC*	Absolute Gain-Coupling Coefficients for Stimulated Brillouin Scattering in Low-Pressure Gases
11:20 – 11:40 AM	Muzzamal Shaukat, *TAMU*	BGK Model with velocity-dependent collision frequency
11:40 – 12:10 PM	Gershon Kurizki, *Weizmann Institute of Science*	Boosting tunneling by collective effects and dynamical control
12:10 PM	**LUNCH**	Tobin Cafeteria (bottom floor UU Bldg.)
Afternoon recreational activities		
6:15 – 7:00 PM	**DINNER**	Lobby of PS Building (next to pendulum)
PS103		
7:00 – 7:30 PM	John Kline, *LANL*	Fundamentals of Laser Fusion
7:30 – 8:00 PM	Alexey Zheltikov, *TAMU*	The meaning of half-life: nuclear decay and fusion vis-à-vis quantum mechanics
8:00 – 8:30 PM	POSTER SESSION / BREAK	
Session chair: Alexey Zheltikov		
8:30 – 9:00 PM	Alexei Sokolov, *TAMU*	Quantum Molecular Coherence in Nonlinear Optics
9:00 – 9:30 PM	Zhenhuan Yi, *TAMU*	Generation of coherent states of photonic dimers
9:30 – 9:50 PM	Barnabas Kim, *TAMU*	Transient Dynamics of Stimulated Brillouin Scattering in Gases

[Link to Book of Abstracts and Quantum Science Camp Program]

Tuesday, July 22, 2025

7:00 – 8:00 AM	**BREAKFAST**	Tobin Cafeteria
PS103	Session chair: Vitaly Kocharovsky	
8:10 – 8:40 AM	Matthew Wolford, *Naval Research Laboratory*	Excimer Driver Technology for Laser Driven Inertial Confinement Fusion Energy, Zoom
8:40 – 9:10 AM	Marlan Scully, *TAMU*	Quantum Controversy
9:10 – 9:40 AM	Wolfgang Schleich *Universität Ulm*	Interference in phase space and phase-only reconstruction
9:40 – 10:10 AM	Linda Reichl, *UT Austin*	Thermalization of Quantum Mechanics
10:10 – 10:40 AM	POSTER SESSION / BREAK	
Session chair: Wolfgang Schleich		
10:40 – 11:05 AM	Hui Wang, *TAMU*	Coherence-assisted work extraction in quantum heat engines
11:05 – 11:35 AM	Philip Kurian *Howard University*	Superradiance in quantum optical mega-networks in biological architectures, and the computational capacity of life in relation to the universe
11:35 – 12:00 PM	James Murray *Howard University*	Exploring quantum life: Creating tailored research experiences for quantum biology lab interns
12:00 PM	**LUNCH**	Tobin Cafeteria
Afternoon recreational activities		
6:15 – 7:00 PM	**DINNER**	Lobby of PS Building (next to pendulum)
PS103	Session chair: Zhenhuan Yi	
7:00 – 8:00 PM	**Poster Presentations**	Posters 1-9
8:00 – 8:30 PM	POSTER SESSION / BREAK	
8:30 – 9:30 PM	**Poster Presentations**	Posters 10-18

Wednesday, July 23, 2025

7:00 – 8:00 AM	**BREAKFAST**	Tobin Cafeteria
PS103	Session chair: Jeff Prevost	
8:10 – 8:40 AM	Olga Kocharovskaya, *TAMU*	Toward single photon – nuclear ensemble interfaces
8:40 – 9:10 AM	Yuri Shvydko, *Argonne National Laboratory*	Nuclear Clock Isomer Scandium-45 and X-ray Free-Electron Lasers (XFEL)
9:10 – 9:40 AM	Andrei Derevianko *University of Nevada*	Building Blocks of a Th-229 solid-state Nuclear Clock
9:40 – 10:10 AM	Konstantin Beyer, *Stevens Institute of Technology*	Gravitational Interactions in Atomic Clocks
10:10 – 10:40 AM	POSTER SESSION / BREAK	
Session chair: Andrei Derevianko		
10:40 – 11:10 AM	Denis Seletskiy *University of New Mexico*	Oscilloscope for quantum light fields
11:10 – 11:40 AM	Jeff Prevost, *University of Texas at San Antonio*	Inside a Superconducting Qubit
11:40 – 12:00 PM	Xiwen Zhang, *TAMU*	Spectral Flux Enhancement of X-Rays for Addressing Ultra Narrow Nuclear Transitions
12:00 PM	**LUNCH**	Tobin Cafeteria
Afternoon recreational activities		

5:00 PM, Barbeque Dinner, Gateway Center (GW) 221/225

6:00 – 6:45 PM: After dinner talk, Suhail Zubairy, *TAMU*, 2024 Nobel Prize in Physics and Some Personal Memories

PS103	Session chair: Cooper Watson	
7:20 – 7:50 PM	Anatoly Svidzinsky, *TAMU*	Vector gravity vs General relativity: comparison with experiment
7:50 – 8:20 PM	Stephen Fulling, *TAMU*	Gravity is just like electromagnetism, except when it isn't
8:20 – 8:40 PM	POSTER SESSION / BREAK	
Session chair: Stephen Fulling		
8:40 – 9:00 PM	Cooper Watson, *TAMU*	Revisiting Weyl's geometric electricity and magnetism
9:00 – 9:15 PM	Reed Nessler, *TAMU*	Radiation from Atoms Falling Through a Wormhole
9:15 – 9:35 PM	Mohit Khurana, *TAMU*	Biased Collapse of a Bell State – Quantum Measurements

Thursday, July 24, 2025

7:00 – 8:00 AM	**BREAKFAST**	Tobin Cafeteria
PS103	Session chair: Dmitri Voronine	
8:10 – 8:40 AM	Lorin Matthews, *Baylor*	Breaking Newton's Law: Using Dusty Plasma to Investigate Anisotropic Forces
8:40 – 9:10 AM	Truell Hyde, *Baylor/CASPER*	Complex Plasma Physics
9:10 – 9:40 AM	Yanhua Shih, *University of Maryland, Baltimore County*	Ghost Frequency Comb and Quantum Ghost Frequency Comb
9:40 – 10:10 AM	Vitaly Kocharovsky, *TAMU*	Hybrid boson sampling and quantum advantage
10:10 – 10:40 AM	POSTER SESSION / BREAK	
Session chair: Yanhua Shih		
10:40 – 11:10 AM	Dmitri Voronine *Univ. of South Florida*	Better sleep with 2D materials: toward sweet dreams via quantum tunneling
11:10 – 12:00 PM	Carlos Ordonez Gustavo Valdivia-Mera *Univ. of Houston*	Thermal Nature of the Causal Diamond Horizon: a Hidden Property of the Inertial Propagator
12:00 PM	**LUNCH**	Tobin Cafeteria
Afternoon recreational activities		
PS103		
5:00 – 6:15 PM	**Problem presentations by high school students (continue at 7:00 PM in LS 206)**	
6:15 – 7:00 PM	**DINNER**	Lobby of PS Building (next to pendulum)
PS103	Session chair: Aart Verhoef	
7:00 – 7:30 PM	Hebin Li *University of Miami*	Optical Two-Dimensional Coherent Spectroscopy of Color-Center Arrays in Diamond
7:30 – 7:45 PM	Chris Marble *Tarleton State University*	Continuously graded CdSe quantum dots: Tomorrow's bright single photon emitters
7:45 – 8:05 PM	Jizhou Wang, *TAMU*	Infrared Wide-Field and Line-Scanning Imaging with Subcellular Spatial Resolution
8:05 – 8:30 PM	POSTER SESSION / BREAK	
Session chair: Hebin Li		
8:30 – 9:00 PM	Cleo Bentley, Jr., *Prairie View A&M University*	Fluorine atom fine structure energy levels from electron average-path elliptical orbits and spin
9:00 – 9:20 PM	Nara Altangerel, *TAMU*	A Quantum Biophysical Tutorial on the Role of aromatic π–π Interactions and Low-Frequency Modes in Brain Function
9:20 – 9:40 PM	Aart Verhoef, *TAMU*	Optical Imaging and Spectroscopy for Agricultural Research

Friday, July 25, 2025

7:00 – 8:00 AM	**BREAKFAST**	Tobin Cafeteria
PS103	Session chair: Carlos Ordonez	
8:10 – 8:40 AM	Eduardo Martin-Martinez *University of Waterloo*	Quantum measurement meets relativity: a pedagogical Introduction to a fundamental puzzle, Zoom
8:40 – 9:10 AM	Philip Stamp, *University of British Columbia*	Interference, Entanglement, and Choice in Quantum Gravity, Zoom
9:10 – 9:40 AM	Gerald Cleaver, *Baylor*	Universal properties of the evolution of the Universe in modified loop quantum cosmology
9:40 – 10:00 AM	Yusef Maleki, *TAMU*	Quantum Eraser Effects from Gravitational Interactions
10:00 – 10:30 AM	BREAK	
10:30 AM	Brandon Kosine, *President of Casper College* *Representative of Casper College Board of Trustees* Marlan Scully, *Quantum Camp & Symposium*	**Concluding remarks, Group Photo, Certificates awarding ceremony**
12:00 PM	**LUNCH**	Tobin Cafeteria
Afternoon recreational activities		

Friday evening, July 25, 2025

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

8:00 PM: Snack food is being delivered to Residence Hall kitchens 352, 244 or 192

Saturday morning, July 26, 2025

5:30 AM Breakfast is set in the Residence Hall kitchens 352, 244 or 192

Posters:

1. Amal Vijayalekshmi Sivakumar, *TAMU*, Single photon trapping in a giant atom cavity coupled to a one-dimensional waveguide
2. Amirali Vanakifarahani, *TAMU*, Hybrid Pumping of High-Power Gas Lasers for Inertial Fusion Applications
3. Ayla Hazrathosseini, *TAMU*, Toward Scalable Quantum Biosensing: Rapid Implantation of Color Centers in Nanodiamonds
4. Dylan Navarro, *University of Costa Rica*, Kaons: beyond the Standard Model?
5. Fan Yang, *TAMU*, Dark-State Enhanced Quantum Battery Charging via a Squeezed Reservoir
6. Kai Lopez, *Universidad de Costa Rica*, Structural Origin and Photonic Mechanisms of Circularly Polarized Iridescence in Jewel Scarab Beetles: A Literature Review
7. Margaret Christ, *QBL/Howard*, Grover's Algorithm in DNA Replication
8. Matías Machado-Garro, *Universidad de Costa Rica*, Tuning Ferromagnetic and Antiferromagnetic Order through Elastic Couplings in Rare-Earth Titanates
9. Ming-Hsun Chou, *TAMU*, Integrating Atomic Force Microscopy-Terminal (AFM-TERS) for Enhanced Raman Spectroscopy and Surface Analysis
10. Nada Eissa, *University of Houston*, Thermal Nature of the Causal Diamond Horizon: A Hidden Property of the Inertial Propagator
11. Punyasloka Sahoo*, TAMU*, Detection and Classification of Micrometer sized Aerosols with Digital Holography
12. Rania Jones, *Howard University*, Enhancing MRI Research through Quantum Fourier Transforms: Toward Improved Large-Scale Analyses of Alzheimer's Disease Neuroimaging Initiative (ADNI) Data
13. Srilakshmi Palanikumar, *Howard University*, Quantum Algorithms for Biomedical Imaging and Genetic Information Processing
14. Wenzhuo Zhang, *TAMU*, Quantum evolution of mixed states and efficiency of quantum heat engines
15. Yanli Shi, *TAMU*, The hybrid magnetic-Doppler nuclear frequency comb memory in iron borate
16. Yiyun Li, *TAMU*, 2D-Velocimetry on Flying Insects with Superior Axial Resolution Employing a Dual-Baseline Scheimpflug Lidar System
17. Zhichao Jiang, *Washington University in St. Louis*, Turbulence-free Interferometry in Atmosphere by Photonic-Dimer Coherent States
18. Zia Harrison, *Howard University*, Furman University, Multi-Photon Superradiance in Protein Fiber Networks of Quantum Emitters

Summer School is organized by:

Bob Brick, Marlan Scully, Anatoly Svidzinsky, Zhenhuan Yi, Aleksei Zheltikov

Afternoon recreational activities

- This year, we will feature a number of afternoon activities such as hiking, kayaking, swimming, rafting, and others.

- The activities will be divided into three groups: free activities, reserved paid activities that are organized by us beforehand, and other paid activities that you can organize yourselves.

- The sign up sheets for these activities will be in the lobby of the dorms so that you can organize into groups and decide who will go, who will drive, etc.

- If you can drive, put a number to the right of your name in the "Number of seats" column. It is up to those interested in the activity to ensure that there are enough drivers with enough seats.

- Rafting and horseback riding can only accommodate a certain number of people, so do not write in more names than there are on the sign up sheet.

- People generally congregate in the lobby around 1:30-2:00 p.m. after lunch to gather together and depart for the activity (although the reserved activities may start later in the afternoon).

Free Activities

Hiking:
The most common spots to hike around Casper are Rotary Park and Casper Mountain. Both are easily within driving range for an afternoon and feature beautiful views. More trails can be found on sites such as alltrails.com.

Swimming:
Sandy Beach at the nearby Alcova Reservoir features nice, cold water and a relatively large area for swimming.

Tate Geological Museum:
The Tate Geological Museum sits on the Casper College Campus at the top of the hill and features various geology and paleontology exhibits. It is free to enter, and we will attempt to organize either a guided tour with a paleontologist who works at the museum or a fossil dig at some point throughout the duration of the summer school/science camp.

Reserved Paid Activities

To start, the summer school/science camp organizers will reserve only one outing of these paid activities for the first week, but we will not hesitate to reserve more if there is more interest shown than there is capacity for each activity. Additional interest forms will be included with the sign up sheets in case the activity is full.

Rafting (now a free activity–paid for by IQSE and Casper Foundation):
The rafting will take place on the North Platte River which runs through Casper and features a few large rapids on the section of the route inside of the city. Cost is usually $20 per person, but the IQSE and Casper Foundation have graciously decided to pay the costs for all those who wish to attend. The location and time will be on the sign up sheet.

Horseback Riding:
Horseback riding has always been a popular activity during the Casper summer school. For this activity, you will be taken on a trail ride around the area by the barn. The cost will be $65 per person. The location, time, and payment details will be on the sign up sheet.

Other Paid Activities

These activities are activities that people have done in the past, but the summer school/science camp organizers will not make reservations for any groups prior to the start of the summer school/science camp.

Shooting Lessons:
Shooting lessons are offered at Wyoming Gun Company in Casper. They will teach you about gun safety, how to shoot properly, and let you practice some after the lesson. The details can be found at the Wyoming Gun Company's website under the "Events" tab.

Kayaking:
Kayaks can be rented relatively cheaply at the Lake Alcova Resort ($75 per 5 hours). They serve on a first come, first serve basis, and rates, availability, and location can all be found at their website alcovaresort.com.