

# TAMU-Baylor-Casper Summer School on Quantum Physics and Biophysics

**Casper College, Casper, Wyoming, July 25-30, 2021**

## Sunday, July 25, 2021

**2:30 PM:** Snack food is being delivered to the Residence Hall kitchen (1st floor)

**5:00 PM:** Dinner is set in the Residence Hall kitchen (1st floor) and stored in fridge for late arrivals

## Monday morning, July 26, 2021

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 Student Center and UWC (UU building)
<b>PS103</b> Session chair: Dmitri Voronine		
8:10 – 8:20 AM	Marlan Scully, <i>TAMU/Baylor</i> , Darren Divine, <i>President of Casper College</i> Welcome	
8:20 – 9:00 AM	Franco Nori, <i>University of Michigan, RIKEN</i>	Quantum Nonlinear Optics Without Photons (Zoom)
9:00 – 9:40 AM	Vladislav Yakovlev, <i>TAMU</i>	Time is Essential: Mini-tutorial on Fluorescence Life-time Imaging
9:40 – 10:20 AM	Aart Verhoef, <i>TAMU</i>	Optical Coherence Tomography: label-free 3D imaging
10:20 – 10:50 AM	BREAK	
Session chair: Vladislav Yakovlev		
10:50 – 11:30 AM	Robert Brick, <i>TAMU</i>	From amino acids to proteins and onward to structure and function of living organisms: a tutorial
11:30 – 12:10 PM	Suhail Zubairy, <i>TAMU</i>	Teaching quantum mechanics to freshmen
12:10 PM	LUNCH	Tobin Cafeteria (bottom floor UU Bldg.)

## Monday evening, July 26, 2021

**Dinner: 6:30 PM, outside PS103**

<b>PS103</b> Session chair: Anton Classen		
7:00 – 7:40 PM	Zhenrong Zhang, <i>Baylor</i>	Imaging Reactions at the Heterogenous Interface
7:40 – 8:00 PM	Weigang Lu, <i>Baylor</i>	From aluminum foil to two-dimensional nanocrystals using ultrasonic exfoliation
8:00 – 8:30 PM	POSTER SESSION / BREAK	
Session chair: Tao Peng		
8:30 – 9:00 PM	Blake Birmingham, <i>Baylor</i>	Fiber-Based Plasmonic Nanofocusing Probe
9:00 – 9:30 PM	Anton Classen, <i>TAMU</i>	Plasmonic structured illumination and intensity correlations for microscopy

**Tuesday morning, July 27, 2021**

7:00 – 8:00 AM	BREAKFAST	Tobin Cafeteria (bottom floor UU Bldg.)
<b>PS103</b> Session chair: Alexey Sokolov		
8:10 – 8:50 AM	Anatoly Svidzinsky <i>TAMU</i>	Enhancing stimulated Raman excitation and two-photon absorption using entangled states of light
8:50 – 9:30 AM	Jung-Tsung Shen <i>Washington University</i>	Tutorial: Photonic bound states and their applications
9:30 – 10:10 AM	Aleks Rebane <i>Montana State University</i>	Two-photon spectroscopy reveals causes of spontaneous symmetry-breaking in nominally symmetric chromophores
10:10 – 10:40 AM	POSTER SESSION / BREAK	
Session chair: Zhenhuan Yi		
10:40 – 11:20 AM	Suhail Zubairy, <i>TAMU</i>	Noise-free amplification via quantum scissors
11:20 – 12:10 PM	Goong Chen and Matthew Scully, <i>TAMU</i>	Vibration Modal Analysis of an ATD for a Human Body
12:10 PM	LUNCH	Tobin Cafeteria (bottom floor UU Bldg.)

**Tuesday evening, July 27, 2021**

**Dinner: 6:30 PM, outside PS103**

<b>PS103</b> Session chair: Robert Brick		
7:00 – 7:30 PM	Ed Fry, <i>TAMU</i>	A Very High Diffuse Reflectivity Material for Optical Studies
7:30 – 8:20 PM	<b>Poster Presentations</b>	Posters 1-10
8:20 – 8:50 PM	BREAK	
Session chair: Blake Birmingham		
8:50 – 9:40 PM	<b>Poster Presentations</b>	Posters 11-20

**Wednesday morning, July 28, 2021**

7:00 – 8:00 AM	BREAKFAST	Tobin Cafeteria (bottom floor UU Bldg.)
<b>PS103</b>	Session chair: Benjamin Strycker	
8:10 – 8:50 AM	Truell Hyde, <i>Baylor</i>	Complex Plasma: Breaking Newton’s 3rd Law on the Lunar Surface
8:50 – 9:30 AM	Alexei Sokolov, <i>TAMU</i>	Coherent molecular spectroscopy Tutorial: Infrared and Raman excitation and probing for micro-spectroscopy and nano-sensing
9:30 – 10:10 AM	Dmitri Voronine <i>Univ. of South Florida</i>	Ultrafast Lasers versus Viruses
10:10 – 10:40 AM	POSTER SESSION / BREAK	
	Session chair: Zhenrong Zhang	
10:40 – 11:00 AM	Xiang-Pei Liu <i>TAMU, USTC</i>	Optical Waveguide Biosensor for Antibody Detection
11:00 – 11:15 AM	Bryant Jerome <i>Rice University</i>	The thermodynamics of desalination and its implications on solar membrane distillation
11:15 – 12:00 PM	Alessandro Alabastri <i>Rice University</i>	From sunlight to freshwater: nanoscale photothermal effects and resonant heat transfer for sustainable solar desalination
12:10 PM	LUNCH	Tobin Cafeteria (bottom floor UU Bldg.)

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

**6:00 PM, After-dinner talk:** Walter Bradley, *Distinguished Professor, Emeritus, Baylor and TAMU*, “*Mysteries of Life*” (Zoom)

**Thursday morning, July 29, 2021**

7:00 – 8:00 AM	BREAKFAST	Tobin Cafeteria (bottom floor UU Bldg.)
<b>PS103</b> Session chair: Frank Narducci		
8:10 – 8:50 AM	Girish Agarwal, <i>TAMU</i>	Complementarity, Wave Particle Duality and Quantum Entanglement: Theory and Experiments
8:50 – 9:25 AM	Tao Peng, <i>TAMU</i>	Imaging through scattering media via space-time encoded patterns
9:25 – 10:00 AM	Benjamin Strycker <i>Baylor</i>	Toward Stimulated Raman Backscattering Amplification with Two Synchronized Lasers
10:00 – 10:30 AM	POSTER SESSION / BREAK	
Session chair: Aart Verhoef		
10:30 – 11:00 AM	David Baltensperger <i>TAMU</i>	Review of potential applications for Raman spectroscopy in agriculture
11:00 – 11:20 AM	Narangerel Altangerel <i>TAMU</i>	In-vivo and in-vitro Raman Spectroscopic Studies of Tumor Skin Lesions of Sinclair Piglets
11:20 – 12:00 PM	Seth Murray, <i>TAMU</i>	Opportunism and complexity in biology and crop improvement: from discovery to prediction with genomics and phenomics and how biophotonics can play a role
12:10 PM	LUNCH	Tobin Cafeteria (bottom floor UU Bldg.)

**Thursday evening, July 29, 2021**

**Dinner (pizza): 6:30 PM, outside PS103**

<b>PS103</b> Session chair: Ed Fry		
7:00 – 7:40 PM	Frank Narducci, <i>Naval Postgraduate School</i>	Towards a T <sup>3</sup> atom interferometer
7:40 – 8:10 PM	Zhenhuan Yi, <i>TAMU</i>	Towards Tip-enhanced Low frequency Raman
8:10 – 8:40 PM	POSTER SESSION / BREAK	
Session chair: Arash Azizi		
8:40-9:05 PM	Reed Nessler <i>TAMU</i>	Antibody binding in LFA as a birth–death process
9:05-9:30 PM	Navid Rajil, <i>TAMU</i>	How do neurons conduct electrical signals?

**Friday morning, July 30, 2021**

7:00 – 8:00 AM	BREAKFAST	Tobin Cafeteria (bottom floor UU Bldg.)
<b>PS103</b> Session chair: Truell Hyde		
8:10 – 8:50 AM	Olga Kocharovskaya <i>TAMU</i>	Quantum Nucleonics
8:50 – 9:30 AM	David Hilton, <i>Baylor</i>	Materials in Extreme Environments: Unlocking New Materials Physics in High Magnetic Fields
9:30 – 10:10 AM	Robert Nevels, <i>TAMU</i>	Optical Pulse Propagation in a Nonlinear Dispersive Medium
10:10 – 10:40 AM	POSTER SESSION / BREAK	
Session chair: David Hilton		
10:40 – 11:10 AM	Mehmet Emre Tasgin <i>Hacettepe University</i>	Quantization of magnetic flux and electron- positron pair creation (Zoom)
11:10 – 11:35 AM	Moochan Kim, <i>TAMU</i>	Entropy and its flow in a simple Quantum System
11:35 – 12:00 PM	Arash Azizi, <i>TAMU</i>	Unruh Radiation and Causality
12:10 PM	LUNCH	Tobin Cafeteria (bottom floor UU Bldg.)

**Friday evening, July 30, 2021**

**5:30 – 6:30 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 31, 2021**

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

## Posters:

1. Nolan Craft, Baylor, *Polarization-dependent Raman Spectroscopy of Anatase and Rutile TiO<sub>2</sub> Micro-crystals*
2. Sahar Delfan, TAMU, *Antibody Detection with Magnetic Nanoparticles*
3. Shahriar Esmaeili, TAMU, *Detection of COVID-19 RNA using luminescence resonance energy transfer between Upconversion and Gold nanoparticles*
4. Zehua Han, TAMU, *Wide-field Stimulated Raman excited fluorescence imaging*
5. Zhenfei Jiang, Baylor, *Characterization of optically synchronized femtosecond and picosecond systems*
6. Rohil Kayastha, Baylor, *Enhancing thermal emission using IR plasmonic coating*
7. Ming-Che Lee, TAMU, *Polarization dependence in Low-Frequency Raman mapping of amino acid crystals*
8. Yiyun Li, TAMU, *Identification of solitary pollinators in flight based on optical characteristics*
9. Jiru Liu, TAMU, *Distribution of Gaussian Entanglement in Linear Optical Systems*
10. Xinghua Liu, TAMU, *Potential absorption measurement by Hong-Ou-Mandel interferometry*
11. Debsuvra Mukhopadhyay, TAMU, *Quantum Optics in Integrated Waveguide Networks*
12. Aman Patel, Baylor, *Analysis of K<sub>2</sub>W<sub>7</sub>O<sub>22</sub> Nanomaterial for a Breathalyzer for Diagnosing Diabetes*
13. Nic Rafie, Baylor, *Application of Stimulated Raman Scattering Interferometry for Gas and Plasma Density Measurements*
14. Dipankar Sen, TAMU, *Non-invasive Imaging of Sorghum Grains Using Extended Focus Fourier Domain Optical Coherence*
15. Jiaxuan Wang, TAMU, *Absorption Measurement using Hong-Ou-Mandel Interferometry with Type-II SPDC Photon Pairs*
16. Bin Xu, University of Florida, *Neutrino Decoherence in Simple Open Quantum Systems*
17. Yining You, University of Florida, *Microscopic origin of molecule excitation via inelastic electron scattering in scanning tunneling microscope*
18. Sahar Zandi, TAMU, *Effectiveness of Augmented Reality (AR) for heritage tourism during the COVID-19 pandemic*
19. Chaofan Zhou, TAMU, *Decay of single photon in cavity with atomic mirrors*
20. Hao Zhu, Baylor, *Phase Transition of Anatase TiO<sub>2</sub> Single Crystals with Large Percentage of (001) Facets: A Raman Mapping and SEM Study*
21. Matt Scully, TAMU, *Vibration Modal Analysis of an ATD for a Human Body*

*Summer School is organized by:*

*Nara Altangerel, Bob Brick, Marlan Scully, Anatoly Svidzinsky, Aart Verhoef, Zhenhuan Yi*