# **Devansh Kalluhole Matham**

New York, NY | (949)-302-3058 | d.kalluholematham@tcu.edu | Github | Linkedin | Website

#### **EDUCATION**

**Texas Christian University** *Bachelors in Science, Physics* 

Fort Worth, TX Aug 2023 - May 2025

Mathematics Minor

**Orange Coast College** 

Associate in Science, Physics

Orange County, CA

Aug 2021 - May 2023

#### **Relevant Coursework:**

- Computational Physics, C++, Java, Python, Solid State Physics, Theoretical Methods in Physics, Thermal Physics, Scientific Analysis and Modelling, Electrodynamics, Advanced Mechanics, Partial Differential Equations, Mathematical Proofs, Discrete Mathematics, Quantum Mechanics

### RESEARCH EXPERIENCE

## Texas Christian University, Department of Physics and Astronomy

Fort Worth, TX *Apr 2025 - Present* 

Research Assistant - <a href="https://github.com/devtcu/Biophysics-ABM">https://github.com/devtcu/Biophysics-ABM</a>

Advisor: Dr. Hana Dobrovolny

- Leveraged CUDA to harness NVIDIA GPU's to accelerate agent-based model (ABM) simulations of viral spread, reducing runtime significantly.
- Enhanced ABM's by integrating stochastic cell-to-cell fusion processes, advancing understanding of cellular dynamics in virus-host interactions.
- Implemented graph neural networks to study spatial heterogeneity of syncytial cells through analysis of topological features such as persistent homology.

## Raman Research Institute, Department of Light and Matter Physics

Visiting Internship - https://github.com/devtcu/Ultracold-Atoms

Bangalore, India

Jun 2024 - Jul 2024

Advisor: Dr. Saptarishi Chaudhuri

- Investigated the trapping of sodium and potassium atoms at ultra-cold temperatures using optical dipole traps.
- Tested lasers through characterization of their physical properties using MATLAB to continue accurate experimentation, ensuring precise trapping performance for atoms.
- Utilized Python to extract image matrices of a laser beam to computationally assess the accuracy of a gaussian fitted spatial profile, and discovered a misalignment on the scale of millimeters.
- Aligned a proposed servo controller electronics system to stabilize the frequency of a trapping laser.

## Texas Christian University, Department of Physics and Astronomy

Fort Worth, TX

Research Assistant - https://github.com/devtcu/CL

Sep 2023 - May 2025

Advisor: Dr. Yuri Strzhemechny

- Designed and implemented components for an ultrahigh vacuum (UHV) characterization chamber, enabling cathodoluminescence spectroscopy of nanomaterials.
- Studied nanosize crystals in zinc oxide and gallium oxide, and spearheaded a study of their preparation techniques.
- Conducted surface spectroscopy (SEM, FTIR, Raman, PL) to analyze nanocrystalline oxides, enhancing preparation techniques for antibacterial applications.

### ACADEMIC PRESENTATIONS/ CONTRIBUTIONS

- "Influence of Surface Structural and Electronic Properties on Antibacterial Action of Nano and Microcrystalline Fe-Zno," Y.M Strzhemechny, J.H Brannon, D.A Johnson, T.Y McHenry, **D.K Matham**, R.E Cuth, S. Kevin, AVS 71st International Symposium & Exhibition, Charlotte NC, Summer 2025
- "Characterization of the Surface Properties of a-GaOOH Microparticles," **D.K. Matham**, M.M Smit, T.Y. McHenry, P. Ahluwalia, Z. Rabine, J.H. Brannon, D.A. Johnson, Y. Strzhemechny. Texas APS Meeting, University of Houston, Spring 2025.
- "Synthesis and Characterization of α-GaOOH Microparticles As a Platform for Investigation of Antibacterial Mechanisms," **D.K. Matham**, M.M Smit, T.Y. McHenry, P. Ahluwalia, Z. Rabine, J.H. Brannon, D.A. Johnson, Y.

- Strzhemechny. Texas APS Meeting, Southern Methodist University, Fall 2024.
- "The Role of Surface/Interface Phenomena in the Antibacterial Action of Nano and Microscale Gallium Oxide and Gallium Hydroxide," Y. Strzhemechny, D.A. Johnson, J.H. Brannon, P. Ahluwalia, T.Y. McHenry, M.M Smit, **D.K. Matham**, Z. Rabine, P. Jodhka, AVS Symposium, Summer 2024
- "Synthesis and Characterization of α-GaOOH Microparticles As a Platform for Investigation of Antibacterial Mechanisms," **D.K. Matham**, M.M Smit, T.Y. McHenry, P. Ahluwalia, Z. Rabine, J.H. Brannon, D.A. Johnson, Y. Strzhemechny. Texas APS Meeting, Tarleton State University, Spring 2024.
- "Cathodoluminescence Spectroscopy A means of Studying Gallium Oxide Micro and Nanocrystals," D.K. Matham, M.M Smit, T.Y. McHenry, J.H. Brannon, D.A. Johnson, Y. Strzhemechny. Science Research Symposium, Texas Christian University, Spring 2024

#### HONORS AND AWARDS

- Best Undergraduate Poster at Texas Section APS Meeting, University of Houston, May 2025 \$100
- Outstanding Undergraduate Poster Award at Texas Section APS Meeting, Southern Methodist University, October 2024 - \$200
- Best Physics Undergraduate Poster Presentation at TCU Student Research Symposium, April 2024
- Dean's Transfer Scholarship TCU, May 2023 \$50,000

## TEACHING EXPERIENCE

Student Success Center

Math Tutor

Orange County, CA
Dec 2022 - May 2023

- Led one-on-one appointments and group sessions for college calculus classes
- Prepared revision material tailored to individual students
- Completed a 10 week tutor specialist course and received certification

#### **SKILLS**

- **Programming Languages:** Python and C++ (highly proficient), Java, MATLAB, CUDA
- Experimental Techniques: SEM, FTIR, Raman, PL Spectroscopy, Cathodoluminescence, UHV Systems
- Machine Learning: TensorFlow, PyTorch, Keras
- Web Development: CSS, HTML, JavaScript
- **Skills:** Git, LaTex
- Languages: English, Hindi, Kannada, Japanese