

# Devansh Kalluhole Matham

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## EDUCATION

### Texas Christian University

*Bachelors in Science, Physics*

*Mathematics Minor*

Fort Worth, TX

May 2025

#### 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

*Research Associate - ([Github 1](#), [Github 2](#))*

Fort Worth, TX

Apr 2025 - Present

Advisor: Dr. Hana Dobrovolny

- Implemented graph neural networks to study spatial heterogeneity of syncytial cells through analysis of topological features.
- 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 in Python, advancing understanding of cellular dynamics in virus-host interactions.

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

*Visiting Internship - ([Github](#))*

Bangalore, India

May 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 of significance to ongoing experiments.
- Aligned a proposed servo controller electronics system to stabilize the frequency of a trapping laser.

### Texas Christian University, Department of Physics and Astronomy

*Research Assistant - ([Github](#))*

Fort Worth, TX

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 studied 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  $\alpha$ -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  $\alpha$ -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  $\alpha$ -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

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- Outstanding Undergraduate Student Poster Award at Texas Section APS Meeting, University of Houston, *May 2025* - \$100
- Outstanding Undergraduate Student 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

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### 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

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