

Devansh Kalluhole Matham

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EDUCATION

Texas Christian University
Bachelors in Science, Physics
Mathematics Minor

Fort Worth, TX
Aug 2023 - May 2025

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
Research Assistant - <https://github.com/devtcu/Biophysics-ABM>

Fort Worth, TX
Apr 2025 - Present

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

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 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 α -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

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- 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

Orange County, CA

Math Tutor

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++ (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