# Diego Torres-Barajas

dtorresb@arizona.edu | (520)-304-1789 | Website | LinkedIn

## EDUCATION

**University of Arizona**, Tucson, AZ
BS in **Applied Mathematics** minor in **Optical Sciences & Engineering**
W. A. Franke Honors College

Expected: May 2025
GPA: 4.00

**Thesis:** *"Simulation and Modeling of Guided Mode Resonance Devices for Rotation Sensing Applications"*  (in progress)
**Advisors:** Dr. Dalziel Wilson & Dr. Mohamed ElKabbash

## EXPERIENCE

**Fringe Metrology**  Tucson, AZ
*Research and Development Intern*  May 2024 - Present

- Developing a novel metrological system to achieve sub-50 micron-level accuracy for objects up to 20 meters in diameter.
- Designed, built, and calibrated high-precision metrology tools using **FMCW LiDAR** and **machine vision** systems, with a focus on rapid-scanning solutions.
- Designed optical systems in **Zemax** and **Autodesk Inventor**, including beam steering, co-alignment, and dynamic focusing, applying alignment, geometrical, and physical optics concepts to meet system criteria.
- Prototyped and assembled hardware for metrology systems; collaborated with interns on product development, design tasks, and further enhancement of existing technologies.

**Quantum Optomechanics Lab**  Tucson, AZ
*Undergraduate Researcher | PI: Dr. Dalziel Wilson*  May 2024 - Present

- Developing a **guided-mode resonance device** made of silicon nitride for use in diffractive rotation sensing. Modeling and simulating optical behavior using both theoretical approaches and software tools (**Tidy3D-FDTD**).
- Conducted extensive simulations and analysis to refine the design of **guided-mode resonance devices**, achieving a high Q-factor for angular sensitivity on nanomechanical rotation sensing.
- Collaborated with the **Quantum Photonics and Nanophotonics Group** to optimize the design of guided-mode resonance devices through simulation techniques.
- Programmed a numerical model in **Python** of 1D and 2D Fraunhofer diffraction for a theoretical framework on a characterization experiment. Achieved accurate and fast results when compared to analytical solutions.

**Steward Observatory Solar Lab**  Tucson, AZ
*Undergraduate Researcher | PI: Dr. Justin Hyatt*  Jan. 2023 - Aug. 2024

- Contributed to constructing a **radio telescope** as part of a team, enhancing research initiatives for a major project. Duties include adjusting mold to sub-40 micron-level accuracy, slumping aluminum panels, and assembling the telescope.
- Used **MATLAB** to analyze point cloud data from measurements to determine the influence of thermoforming process to final product of aluminum panels.
- Directed drilling automation project for thermoforming mold adjustments using **Arduino** and **MATLAB**. Implemented a **PID controller** to turn a DC motor to a target position with an error of less than 3 degrees.
- Performed soldering, saw-cutting, drilling, data analysis (**MATLAB**), and design (**Autodesk Inventor**) tasks.

**University of Arizona Space Astrophysics Lab**  Tucson, AZ
*Undergraduate Researcher | PI: Dr. Ewan Douglas*  Aug. 2023 - May 2024

- Designed and implemented a **polarimetry experiment** to characterize linear polarization states of light using Stokes parameters and a quad-polarizer camera.
- Analyzed polarization states using **Stokes parameters** and developed software for data acquisition and processing with camera's software development kit, **Raspberry PI**, and **Python** libraries `Numpy` and `Matplotlib`.
- Presented one year of research in a poster, effectively communicating the results of the polarimetry project to diverse audiences, including technical and non-technical groups.
- Explored error reduction techniques and proposed potential extensions for complex polarization state analysis.

## SKILLS

- **Relevant Coursework:** Linear Algebra for Data Science; Quantum Mechanics (Graduate Level); Numerical Analysis; Advanced Applied Analysis; Radiometry, Sources, & Detectors; Physical Optics I; Geometrical and Instrumental Optics
- **Programming & Libraries**: Python (`Numpy, Matplotlib, Pandas, SciPy, OpenCV`), C
- **Software**: Autodesk Inventor, SolidWorks, MATLAB, Tidy3D, Zemax
- **Hardware**: Arduino, Raspberry Pi, CNC Machining, Soldering, Laser Cutter, 3D Printer
- **Development Tools**: Git, Github, Bash, Linux Terminal, Vim