Diego Torres-Barajas

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EDUCATION

University of Arizona, Tucson, AZ — Expected: May 2025
BS in **Applied Mathematics** minor in **Optical Sciences & Engineering** — GPA: 4.00
W. A. Franke Honors College

EXPERIENCE

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

- Developing and testing 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.
- Synchronized LiDAR range data with fast steering mirror (FSM) positions; developed software for timestamp matching and generating 3D point clouds.
- 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.
- Implemented parametric design techniques to create adaptable CAD models that automatically adjust based on user-defined requirements.
- 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**) to optimize device performance.
- Programmed a numerical model in **Python** of 1D and 2D Fraunhofer diffraction for a theoretical framework on an 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 built an experimental setup for **polarized light characterization** using principles from polarization literature sources and optics catalogs, resulting in a comprehensive analysis of polarized light properties.
- Applied knowledge of optical alignments and beam collimation techniques with iris diaphragms and shear interferometers.
- Implemented software development kit and **Raspberry PI** technology to capture polarimetry data sets, showcasing adeptness in utilizing advanced tools for scientific research.
- Utilized **Python** libraries `Numpy` and `Matplotlib` to analyze data and identify Stokes parameters from incident light.

SKILLS

- **Relevant Coursework:** Linear Algebra for Data Science, Quantum Mechanics, Numerical Analysis, Advanced Applied Mathematics, Radiometry, Physical Optics I, Mathematical Reasoning & Writing, 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
- **Languages:** Spanish (Native), English (Full Professional)