Arturo O. **Martinez**

Research Scientist · Astronomer

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Executive Summary

Highly motivated research scientist with 9+ years of experience analyzing scientific data, 5+ years of experience in inverse problems using optimization tools and regularization techniques, and writing open-source software for modeling and imaging in astronomy. Currently leading two projects dealing with instrumental optical alignment and astronomical imaging, and co-led various projects in dealing with other types of astronomical imaging & modeling. Eager to develop new skills, and take skills learned in academia and apply them to any applications outside of astronomy.

Skills

Programming Languages:	Julia, Python
Software/Tools:	Git, Optimization tools (e.g., NLOpt, OptimPack), Linux, NumPy, Pandas, Matplotlib, SQL, SQLite3
Document Preparation:	LaTeX, LibreOffice (Writer, Impress, Calc), Microsoft Office (Word, Powerpoint, Excel)
Spoken Languages:	English (native), Spanish (conversant)
Professional:	Adaptability, Verbal Communication, Teamwork/Collaboration, Independent, Problem Solving, Critical Thinking, Research and Analysis, Data Visualization, Data Modeling, Statistical Analysis

Employment

Bay Area Environmental Research Institute — *Moffett Field, CA, USA*

NASA Research Scientist — *Jul. 2021 – present*

- Tasked with revamping and incorporating newer image analysis software for astronomy, and apply them to short-exposure (speckle) images.
- Transcribe and maintain software, from Matlab to Julia, which retrieves the original object in speckle images by deconvolving the object from the atmospheric turbulence.
- Co-led projects solving the inverse problem by filtering/cleaning unstructured astronomical data and created reconstructed images using newer deconvolution techniques of high priority astronomical objects (*"High Contrast, High Angular Resolution Optical Speckle Imaging: Uncovering Hidden Stellar Companions"*), and made suggestions to astronomical observing strategies for better image quality.
- Spearheaded project investigating amount of optical aberrations in research imaging instruments showing how optical quality within an instrument can change throughout any given night.
- Collaborated with scientists from various institutions (e.g., Caltech, NASA Ames, Georgia State University, Georgia Tech Research Institute) and showcased research at astronomy science conferences at nontechnical levels.

Georgia State University — *Atlanta, GA, USA*

Graduate Research Assistant — *Jan. 2017 – Jun. 2021*

- As a graduate research assistant, was tasked with testing primitive 3-D imaging Julia code for optical interferometry and building atmospheric turbulence simulator in an optics laboratory.
- Collaborated in writing proposals to obtain telescope time at a world-class interferometer (CHARA Array) to obtain new stellar astronomy data and filtered/cleaned unstructured data in order to test 3-D imaging code.
- Updated untested 3-D imaging code using interferometric data with new 3-D models aimed at showing stellar surface features, and created images by solving an inverse interferometric imaging problem and using optimization algorithms.
- Built an atmospheric turbulence simulator and created destructive interference. Analyzed preliminary limits of beam propagation through horizontal atmospheric turbulence.
- Presented and published 3-D surface images to a professional astronomy scientific journal and conference showcasing world's 3rd detailed 3-D surface image of a heavily spotted star (*"Dynamical Surface Imaging of λ Andromedae"*), and calculated more accurate physical parameterization compared to previous 2-D imaging works.
- Presented optics laboratory results for a wide audience at science conferences showcasing preliminary results free-space beam propagation for an interferometer through different levels of atmospheric turbulence (*"Looking into the future of interferometry using free-space beam propagation"*).

Georgia State University *Atlanta, GA, USA*

College Lecturer *Jan. 2020 – May 2020*

- Taught 15-week introductory level astronomy course to a class of 50+ students covering stars, galaxies, and cosmology.
- Gave lectures initially in a classroom setting but migrated towards and adapted to online setting during COVID-19 lockdowns.
- Provided exams to gauge student understand of material and provided office hours/email availability to answer student's questions.

Georgia State University *Atlanta, GA, USA*

Laboratory Instructor *Aug. 2016 – Dec. 2019*

- Taught laboratory portion of 15-week undergraduate courses in astronomy to a class of ∼20 students to provide understanding of lectures.
- Gave brief lectures at the beginning of each class to explain topic and monitored laboratory work for each student.
- Assisted students with completing laboratory work and graded laboratory work to ensure student retention of lecture material.

University of Arizona *Tucson, AZ, USA*

Visiting Research Scientist *Jun. 2015 – Dec. 2016*

- Initially worked as a summer research intern which expanded into a 1.5-year project in order to find the physical properties of several low-mass stars of interest.
- Obtained spectroscopic data, removed noise from data (or filtered/cleaned unstructured data), and created Python software for analysis.
- Calculated physical properties of 34 low-mass stellar systems and their respective planetary physical parameters.
- Presented results at various professional astronomy science conferences to many different audiences (in Jan. 2016).
- Collaborated with various scientists and published results to a professional astronomy scientific journal (in early 2017; *"Stellar and Planetary Parameters for K2's Late-type Dwarf Systems from C1 to C5"*).
- Found a 0.15 median stellar radius correction toward more accurate stellar parameterization, which served as a basis for calibtation for future research.

Education

Georgia State University *Atlanta, GA, USA*

Doctor of Philosophy – Astronomy *Aug. 2016 – Aug. 2021*

- Dissertation title: "*Exploring Interferometric Realms: Modeling and Imaging of Stars, and Optical Test Bench Simulations*".
- Second Century Initative University Doctoral Fellow

Georgia State University *Atlanta, GA, USA*

Master of Science – Physics (with concentration in Astronomy) *Aug. 2016 – May 2018*

- Second Century Initative University Doctoral Fellow

San Diego State University *San Diego, CA, USA*

Bachelor of Science – Astronomy (with Math Minor) *Sep. 2011 – May 2015*

- Cal-Bridge Scholar

Service

NASA Proposal Reviewer *Undisclosed (due to NDA)*

NASA Science Mission Directorate Review Panel *Undisclosed (due to NDA)*

- Served as a panelist to provide objective reviews for several NASA proposals according to NASA proposal guidelines.
- Ranked proposals to allow NASA fund projects that would greatly benefit society & work on cutting-edge science projects.

Early Career Working Group Co-Lead *Remote*

NASA Science Mission Directorate Bridge Program *Aug. 2022 – Oct. 2023*

- Co-directed a group of early career individuals for NASA to provide insights for best practices of academic success for future STEM students.
- In coordination with other groups, published NASA report highlighting recommendations to extend assistance to underserved STEM community based on community feedback (*"Report from the Bridge Program Workshop Organizing Committee"*).
- Published a white paper based on recommendations of early-career professionals in different STEM fields (*"Early Career Perspectives for the NASA SMD Bridge Program"*).