

Dahlia A. Baker

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Education

- University of Colorado Boulder** — Ph.D. Aerospace Engineering Sciences August 2018 — present
Fellowship: National Science Foundation Graduate Research Fellow, 2018-2023
Projected Conferral: August 2023
Dissertation: Asteroid Surfaces and Dynamical Evolution with the YORP Effect
Advisor: Dr. Jay W. McMahon
- University of Colorado Boulder** — M.S. Aerospace Engineering Sciences August 2018 — May 2011
Astrodynamics and Satellite Navigation Focus
Relevant coursework: Advanced Astrodynamics, Aerospace Environment, Statistical Orbit Determination, Differential Dynamical Systems, Intro to GNSS, Spacecraft Attitude Dynamics and Control, Space Mission Design, Advanced State Estimation
- Coe College** — B.A. Physics, Mathematics Minor, Cedar Rapids IA August 2014 — May 2018
Relevant coursework: Modern Physics, Electricity and Magnetism, Thermodynamics and Statistical Mechanics, Renewable Energy, Classical Mechanics, Quantum Mechanics, Relativity, Advanced Lab for Glass Science, Optics, Calculus, Differential Equations, Linear Algebra, General Chemistry I and II

Research Interests

Astrodynamics, asteroid dynamics and evolution, asteroid surfaces, asteroid shape modeling, spacecraft navigation, simulation and modeling, in-situ resource utilization

Internships

- NASA Pathways Internship, Navigation Branch - NASA GSFC** June 2021 - present
Participated in radiometric navigation verification for the LCRNS project under the GSFC 595 branch. Studied the effects of various on-board timing and measurement types for relay communications for descent trajectories to the Lunar surface. Co-author of paper presented at ION ITM conference.
- NASA OSIRIS-REx Flight Dynamics Intern - NASA GSFC** June - August 2020
Investigated limb-based shape modeling methods for autonomous approach to small bodies. Was able to identify areas of improvement and recommend further work. Results used to advance onboard capabilities. Other tasks included aiding the Independent Verification and Validation team in submitting daily navigation solutions.
- Brooke Owens Fellow** — Planetary Resources, Inc. June - August 2017
Research on asteroid shape model methods with the Data Team, and was tasked with recommending a best approach for an asteroid mining mission. Involved computer vision, robotics, and planetary science investigations. Was part of the inaugural class of Brooke Owens Fellows.

Teaching Experience

Teaching Assistant, Summer Science Program (SSP), Boulder CO

June - August 2018

Mentored and supervised 36 high school students for six weeks. Guided them through astronomy, mathematics, physics, and programming classes to track near-earth asteroids and complete orbit determination solutions using the Lagrangian method. Responsibilities included grading, holding office hours, developing activities, supervising lab work, and providing a college-like environment.

Skills and Involvement

C, C++, Java, Python, Tcl/Tk, Matlab, LaTeX

Software Development, Git, PyTest

GMAT, Blender, SPICE, MONTE, VisualSFM, Meshlab,

VMD/NAMD visualization tools

Hands-on observatory experience and field

deployment observing

Participation in occultation measurement campaign of

Justitia for UAE EMA Mission

Presentations and Publications

Journal Papers

1. "Boulder-Induced Variability in the YORP Effect" -
D. A. Baker, J.W. McMahon, Planetary Sciences Journal, September 2023 (in preparation)
2. "Post Situ Neutron and Gamma Radiation Damage Tests on Different Quartz Types" —
F. Duru, **D. Baker**, J. Schletzbaum, P. Bruecken, Y. Onel, A. Konik, and U. Akgun.
Journal of Instrumentation 11, JINST_002T_0716, 2016

Conference Presentations

1. *Presentation*: "Statistical Variation in YORP Evolution due to Random Boulder Populations", AAS DDA Conference, May 2023
2. *Poster*: "Dynamic Evolution of Asteroid Shape and Spin from the YORP Effect", AAS DPS Conference, Oct. 2022
3. *Manuscript and Presentation*: "Shape and Pole Estimation for Small-Bodies on Approach", AIAA SciTech Forum, Jan. 2022
4. *Manuscript and Presentation*: "Limb-Based Shape Modeling and Localization for Autonomous Navigation Around Small Bodies", AAS/AIAA Astrodynamics Specialist Conference, Aug. 2020.
5. *Manuscript and Poster*: "Limb-Based Shape Modeling: A Demonstration on Itokawa", RPI Space Imaging Workshop, Oct. 2019. Placed 3rd in Student Paper Competition
6. "Absorber Coating for Mid-Infrared Astrophysics" - American Astronomical Society 229th Winter Meeting, January 2017