Matthew J. Doty

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Education:

B.S. (Major: Physics - Advanced Physics Concentration / Minor: Philosophy): University of Notre Dame, expected May 2025 - GPA: 3.91/4.00
H.S Diploma: Granville High School, 2021 – GPA 3.99/4.00 (unweighted)

Experience:

Research Assistant, University of Notre Dame (w/ Prof. L. Weiss)
Research Assistant, University of Indiana (w/Prof. C. Petrovich)
Research Assistant, Denison University (w/ Prof. Eric Winters)
Student Program in Healthcare, Ascension Providence Hospital, Southfield MI (w/ Jeff Flynn) Umpire, OHSAA and Summer Travel (w/ Phil Jenkins and Mark Spicer) Personal Assistant, Apex Pitching (w/ Andy Larned)

Publications and Presentations:

Published

1. "Finding Common Ground", Accepted to *Fresh Writing*, 2022, University of Notre Dame

Submitted

2. "From Stability to Instability: Characterizing the Eccentricities of Multi-planet Systems in the California Kepler Survey as a Means of Studying Stability," M. Doty, L. Weiss, M. He, and A. Petit. Submitted to the Astronomical Journal, October 2024

In Preparation

3. "Kepler-139: an Example of Sweeping Resonances causing Non-Uniform Architecture," M. Doty, M. Best, A. Sefilian, C. Charalambous, C. Petrovich. In preparation for submission to the Astrophysical Journal by Feburary 2025

4. "The Kinetic Chain in Overhand Throwing", in preparation for submission to Sports Medicine International Open (by Summer 2025), co-authored with E. Winters et al.

5. "The Role of the Soul in Valuation of Human Beings," in preparation for submission to the Canadian Journal of Philosophy. Supervised by Joshua Seachris, University of Notre Dame.

Presentations

1. "The Kinetic Chain in Overhand Throwing," EGLS section of the American Physical Society, April, 2023.
2. "Large Companions - How the Dynamical Stability of Kepler 444 is related to the presence of an Outer Binary," GLEAM 2023, October, 2023

3. “Characterizing the transition from stability to instability in compact multi-planet systems”, 55th Annual Meeting of the DDA, May 2024
4. “Characterizing the transition from stability to instability in compact multi-planet systems”, Exoplanets 5, May 2024

Research*:*

Exoplanet system stability

Working with Prof. Weiss and Dr. He to explore the use of n-body simulations and angular momentum deficit to understand the stability of planetary systems and the effects of large outer binaries, eccentricities, and close encounters. Wrote few thousand lines of Python code to setup, run, analyze models; working knowledge of REBOUND code, SPOCK code, and Kepler exoplanet database.

Planetary Formation

Working with Dr. Cristobal Petrovich and Marcy Best to explore how secular resonances can influence planet formation. Using known planetary systems extrapolated via a proposed formation mechanism the necessary initial conditions to form the system. Worked with multiple models a few thousand lines long and wrote a few thousand lines of Python code to setup, run, and analyze results. Obtained a understanding of planet formation theory, secular resonance, and the Kepler Giant Planet Survey. Modeled known planetary system and found strong evidence to suggest observed architecture was formed by sweeping resonances of plantesimals.

Biomechanics of overhand throwing

Part of overhand throwing evaluation program at Denison University. Worked with subjects to collect data. Wrote 5k lines Fortran to analyze kinetic chain. Found that a) segmental ordering is secondary to hip/shoulder timing, consistent with a stretch reflex, and that b) the shoulder plays a large role in throw efficiency. In preparation for submission to a professional journal.

Honors & Awards:

Scholarships:

NPG Scholarship (2021, 2022)
Victor & Dorothy Marotta Scholarship (2023,2024)
Alfred E. Tonti Scholarship (2023,2024)
D. Eartly & A. Lennox Scholarship (2024)
Notre Dame Club of Columbus Scholarship (2024)

Deans List (University of Notre Dame): 2021, 2022, 2023
Invited to apply as Sorin Scholar: 2022
Finalist, Oxford year abroad (University of Notre Dame): 2022
ACE Leadership Award (University of Notre Dame): 2022
Ascension Hospital Summer Internship: 2022

Professional Societies:

American Physical Society (member)

Service/Community Activities:

Academic

Tutor (Physics), University of Notre Dame Learning Resource Center,
2023-present Judge (REU Physics Olympiad), University of Notre Dame, 2023 Tutor (Physics), College of the Holy Cross, 2022-2023

Support

St Andre Committee (Welcome/support/new student programming), Dillon Hall: 2022-2023

Music

Jazz Band 2, University of Notre Dame: 2021-present
Symphonic Winds, University of Notre Dame: 2022-present
Domestic Tour Band, University of Notre Dame: 2023

Catechesis Teacher

St. Stanislaus Kostka Church, New Carlisle, IN, 5th & 6th grade: 2023
St. Jude, Notre Dame, IN, 7th & 8th grade: 2024-present
Holy Family Church, Notre Dame, IN, 3rd & 4th grade, 5th & 6th grade: 2021-2023

St Patrick's Chapel, Dillon Hall, Notre Dame Lector
: 2021-present
Eucharistic Minister: 2021-present
Psalmist: 2022-present

Athletics

Co-founder and President, Wiffleball Club of Notre Dame: 2021-present

Other

Knights of Columbus, council 1477, University of Notre Dame,
2021-present Habitat for Humanity: 2018-present
- Helped build 4 houses and 2 playhouses

References:

Prof. Lauren Weiss, University of Notre Dame, Exoplanet Project – lweiss4@nd.edu – Dr. Cristobal Petrovich, University of Indiana, Planet Formation Project – cpetrovi@iu.edu -- Dr. Matthias He, University of Notre Dame, Exoplanet Project – mhe@nd.edu - Prof. Joshua Seachris, University of Notre Dame, Philosophy Project – jseachris@nd.edu - Prof. Yuhsin Tsai, University of Notre Dame, Course Professor – ytsai3@nd.edu - Prof. Eric Winters, Denison University, Overhand Throwing Project – winterse@denison.edu - Andy Larned, DBAT Columbus, Previous Employer and Collaborator in Throwing Program – andy@dbatcolumbus.com