Isaac G. Smith

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Education

2024 - present **Weizmann Institute of Science (WIS)**
2020 - 2024 **Michigan State University (MSU)** (GPA: 4.0/4.0)
B.S. in Physics, College of Natural Science, Honors College
B.S. in Mathematics, Advanced, College of Natural Science, Honors College
Minor in Music (vocalist), College of Music

Research Experience

Research Assistant, Facility for Rare Isotope Beams, MSU Nov 2022 - Jul 2024

- Developed and implemented a finite-temperature formalism for the IMSRG many-body solver.
- Analyzed data from the finite-temperature IMSRG using an exactly-solvable schematic model.
- Studied the effect of temperature on the stability of calcium isotopes.

Research Assistant, TARDIS Collaboration, MSU Sep 2020 - Aug 2023

- Wrote an extensive physics walkthrough for the TARDIS radiative transfer code.
- Participated in MSU's Engineering Summer Undergraduate Research Experience program.
- Developed the STARDIS stellar radiative transfer code, a companion code to TARDIS.

Teaching and Mentoring

Learning Assistant for Calculus II, MSU Jan 2024 - Apr 2024

- Taught weekly recetations for two Calculus II classes.
- Tutored calculus students in MSU's Math Learning Center.
- Graded quizzes and exams.

Mentor, TARDIS Collaboration, MSU May 2021 - Aug 2023

- Mentored seven students in contributing to the TARDIS collaboration through the TARDIS high school program, professorial assistantships, or Google's Summer of Code.
- Led weekly meetings discussing physics concepts that are used in the TARDIS code.

Tutor Sep 2018 - June 2024

- Tutored over 20 students in subjects including physics, calculus, and biology.

Publications

Shields, Joshua V., Wolfgang Kerzendorf, Isaac G. Smith, Tiago M. D. Pereira, Christian Vogl, Ryan Groneck, Andrew Fullard, Jaladh Singhal, Jing Lu, and Christopher J. Fontes (2025). *Introducing STARDIS: An Open and Modular Stellar Spectral Synthesis Code*. arXiv: 2504.17762 [astro-ph.SR]. URL: https://arxiv.org/abs/2504.17762.

Smith, Isaac G., Heiko Hergert, and Scott K. Bogner (Apr. 2025). "In-medium similarity renormalization group at finite temperature". In: *Physical Review C* 111.4. ISSN: 2469-9993. DOI: 10.1103/physrevc.111.044318. URL: http://dx.doi.org/10.1103/PhysRevC.111.044318.

Blondin, Stéphane, Sergei Blinnikov, Fionntan P. Callan, Christine E. Collins, Luc Dessart, Wesley Even, Andreas Flörs, Andrew G. Fullard, D. John Hillier, Anders Jerkstrand, Daniel Kasen, Boaz Katz, Wolfgang Kerzendorf, Alexandra Kozyreva, Jack O'Brien, Ezequiel A. Pássaro, Nathaniel Roth, Ken J. Shen, Luke Shingles, Stuart A. Sim, Jaladh Singhal, Isaac G. Smith, Elena Sorokina, Victor P. Utrobin, Christian Vogl, Marc Williamson, Ryan Wollaeger, Stan E. Woosley, and Nahliel Wygoda (Dec. 2022). "StaNdaRT: a repository of standardised test models and outputs for supernova radiative transfer". In: *Astronomy & Astrophysics* 668, A163. ISSN: 1432-0746. DOI: 10.1051/0004-6361/202244134. URL: http://dx.doi.org/10.1051/0004-6361/202244134.

Presentations

Smith, Isaac G. (July 26, 2023). "Studying Nuclei at Finite Temperature with the In-Medium Similarity Renormalization Group". In: *Mid-Michigan Symposium for Undergraduate Research*. East Lansing, MI.

Smith, Isaac G. (April 14, 2023). "A New Approach to Synthetic Stellar Spectra: The STARDIS Radiative Transfer Code". In: *University Undergraduate Research and Arts Forum*. East Lansing, MI.

Smith, Isaac G. (July 28, 2021). "Interactive and User-Friendly Methods for Documenting Code". In: *Mid-Michigan Symposium for Undergraduate Research*. East Lansing, MI.

Major Projects and Unpublished Work

The Geometric Formulation of Classical Physics

My undergraduate thesis in mathematics, which details the relationship between symplectic geometry and classical mechanics, as well as the relationship between measure theory, contact geometry, statistical mechanics, and thermodynamics.

STARDIS Radiative Transfer Code Link to Repository

I made major contributions to the early development of the STARDIS radiative transfer code.

TARDIS Documentation Link to Documentation

I designed comprehensive, interactive documentation for the TARDIS radiative transfer code, and was the main author for the physics walthrough.

Honors and Awards

2024	Carl L. Foiles Award, MSU (top graduating physics student)
2024	Board of Trustees Award, MSU (4.0 GPA)
2024	MSU Integration Bee Third Place
2023	Jeffrey R. Cole Honors College Research Fund, MSU
2021, 2023	Lawrence W. Hantel Fellowship, MSU (physics research award)
2023	Nominee, Rhodes Scholarship, MSU
2023	Nominee, Marshall Scholarship, MSU
2022	L.C. Plant Mathematics Award, MSU
2021, 2022	NumFOCUS Small Development Grant
2020	Alumni Distinguished Scholar, MSU (MSU's top merit scholarship)
2020	National Merit Scholar
2020-2024	Dean's List, MSU (all semesters)

Skills

Proficient in Python, C, C++, Git, and Linux
Intermediate level in Hebrew

Last updated: April 28, 2025