

Igor Z. Palubski

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Education

University of California, Irvine

Ph.D in Physics (Computational/Theoretical)

Irvine, CA

Expected Graduation: July 2024

Iowa State University

B.S in Physics (with minors in Math and Astronomy)

Ames, IA

Awarded 2017

Programming Languages: Python • C • Matlab • Java • JavaScript • HTML

Familiar with: React • MPI • PyTorch • Linux Systems • SQL • Git • Docker

Natural Languages: English (fluent) • Polish (fluent)

Related Coursework: Three graduate level courses in Machine Learning

Software and Data Analysis Experience

University of California, Irvine - Graduate Student Researcher

Irvine, CA

Astrophysics Theory

November 2020 - Present

Develop and analyze cosmological, hydrodynamical simulations for Dark Matter studies.

- Developed a numerical model for dark matter interactions in galaxies and contributed several key functionalities in an existing hydrodynamical physics code, [GIZMO](#), used for galaxy simulations. Improvements include new physics routines: a variety of scattering models, an evolving baryon gravitational potential, and model verification tools.
- Determined an empirical fit that predicts the evolution of dark matter halos under any velocity-dependent interaction cross section.
- Created a set of analysis [tools](#) in Python for large galaxy simulation data sets.

Shields Center for Exoplanet Climate and Interdisciplinary Education

Irvine, CA

Atmospheric Physics

August 2018 - November 2020

Extrasolar planet climate studies using a hierarchy of numerical models of varying complexity.

- Explored the effects of orbital dynamics on the habitability of Extrasolar planets by implementing a parallelized 1-Dimensional Energy Balance Model in Matlab for large parameter space scans on supercomputers. Results show that a significant habitable zone is present even at high orbital eccentricities.
- Wrote a fortran script for creating climatic initial conditions for synchronously rotating planets of desired spatial resolution for the Global Circulation Models — a set of sophisticated 3D hydrodynamical climate models.

Communication Skills

Publications

- A General Evolution Model of Self-Interacting Dark Matter Halos with velocity-dependent cross sections. (in-prep)
- Numerical Challenges in Modeling Gravothermal Collapse in Self-Interacting Dark Matter Halos [link](#)
- Terminator Habitability: the Case for Limited Water Availability on M-dwarf Planets [link](#)
- The Eccentric Habitable Zone: Habitability and Water Loss Limits on Eccentric Planets [link](#)
- Red-dwarf Habitability Recipe, August Publications issue of Sky and Telescope, Vol. 138, Issue 2, pg. 34-40. [link](#)
- Global Energy Budgets for Terrestrial Extrasolar Planets [link](#)
- Imaging the Localized Plasmon Resonance Modes in Graphene Nanoribbons [link](#)

Talks and Poster Presentations

- Habitability and Water Loss Limits on Eccentric Planets Orbiting Main-Sequence Stars, ExSoCal 2020 and American Astronomical Society/Division for Planetary Sciences Meeting October 2020 (**Talks**)
- Temporal Habitability and Water Loss Limits on Eccentric Planets, Exoclimates V, August 2019 and Sagan Exoplanet Summer Workshop, July 2019. (**Posters**)
- Eccentricity Thresholds for Planetary Deglaciation at Varying Obliquity, KITP Conference: "Planet-Star Connections in the Era of TESS and Gaia", May 2019 and American Astronomical Society, AAS Meeting 233, id.247.24, January 2019 (**Posters**)

Interests

- Aquatic activities: scuba diving, snorkeling, underwater photography, kayaking; history and learning new things