

Ryan Low

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SUMMARY

Ryan Low is an Astrophysics Theory PhD. His research interests lie at the intersection of structure formation, phenomenological modeling, and advanced machine learning methods.

POSITIONS

PhD Student

Aug 2020 - Present

Using hydrodynamical cosmological simulations, can we use novel methods to detect and constrain generic self-interacting dark matter models? Performing these simulations requires high performance computing. Analysis involves handling big data with both C/C++ and Python. Major projects include studying how modified dark matter physics affects small scale structure formation and how to connect simulation results to observation beyond summary statistics.

Teaching Assistant

Jan 2020 - Present

– Quantum Mechanics I

2020

– Mechanics Laboratory

2020 - 2022

– Optics Laboratory

2022 - 2024

– Graduate Problem Solving

2024 - Present

EDUCATION

2020 - present PhD Physics at **University of Kansas** (Expected Defense: May 2026) (GPA: 4.0/4.0)

2016 - 2020 B. Sc. Physics at **University of California, San Diego** (GPA: 3.8/4.0, Cum Laude)

PUBLICATIONS

Low, Ryan, Adhikari, Rakshak, Rose, Jonah C., O’Neil, Stephanie, et al. Mar. 2025. “Structure Formation under Inelastic Two-Component Dark Matter: Halo Statistics and Matter Power Spectra in the High- z Universe”. In: *arXiv e-prints*, arXiv:2503.05881, arXiv:2503.05881. DOI: [10.48550/arXiv.2503.05881](#). arXiv: [2503.05881](#) [[astro-ph.CO](#)].

Rose, Jonah C., Torrey, Paul, Villaescusa-Navarro, Francisco, Lisanti, Mariangela, [...], **Low, Ryan**, et al. Apr. 2025. “Introducing the DREAMS Project: DaRk mattEr and Astrophysics with Machine Learning and Simulations”. In: *ApJ* 982.2, 68, p. 68. DOI: [10.3847/1538-4357/adb8e5](#). arXiv: [2405.00766](#) [[astro-ph.GA](#)].

Kirkpatrick, J. Davy, Marocco, Federico, Gelino, Christopher R., Raghu, Yadukrishna, [...], **Low, Ryan**, et al. Apr. 2024. “The Initial Mass Function Based on the Full-sky 20 pc Census of ~ 3600 Stars and Brown Dwarfs”. In: *ApJS* 271.2, 55, p. 55. DOI: [10.3847/1538-4365/ad24e2](#). arXiv: [2312.03639](#) [[astro-ph.SR](#)].

Rose, Jonah C., Torrey, Paul, Villaescusa-Navarro, Francisco, Vogelsberger, Mark, [...], **Low, Ryan**, et al. Jan. 2024. “Inferring warm dark matter masses with deep learning”. In: *MNRAS* 527.1, pp. 739–755. DOI: [10.1093/mnras/stad3260](#). arXiv: [2304.14432](#) [[astro-ph.CO](#)].

O’Neil, Stephanie, Vogelsberger, Mark, Heeba, Saniya, Schutz, Katelin, [...], **Low, Ryan**, et al. Sept. 2023. “Endothermic self-interacting dark matter in Milky Way-like dark matter haloes”. In: *MNRAS* 524.1, pp. 288–306. DOI: [10.1093/mnras/stad1850](https://doi.org/10.1093/mnras/stad1850). arXiv: [2210.16328](https://arxiv.org/abs/2210.16328) [[astro-ph.GA](#)].

Low, Ryan, Burgasser, Adam J., Reyl  , C  line, Gerasimov, Roman, Hsu, Chih-Chun, and Theissen, Christopher A. Feb. 2021. “Spectroscopic Confirmation of an M6 Dwarf Companion to the Nearby Star BD-08 2582”. In: *Research Notes of the American Astronomical Society* 5.2, 26, p. 26. DOI: [10.3847/2515-5172/abe470](https://doi.org/10.3847/2515-5172/abe470).

PRESENTATIONS

Low, Ryan, Adhikari, Rakshak, Medvedev, Mikhail, Vogelsberger, Mark, et al. Apr. 2022. “Lyman-alpha forest studies of cosmological simulations with inelastic two-component dark matter (2cDM)”. In: *APS April Meeting Abstracts*. Vol. 2022. APS Meeting Abstracts, S17.051, S17.051.

Low, Ryan, Adhikari, Rakshak, Medvedev, Mikhail, O’Neil, Stephanie, et al. Apr. 2023. “Numerical studies of inelastic dark matter cosmology”. In: *APS April Meeting Abstracts*. Vol. 2023. APS Meeting Abstracts, P01.004, P01.004.

Low, Ryan, Adhikari, Rakshak, Medvedev, Mikhail, Vogelsberger, Mark, et al. Apr. 2024. “Effect of inelastic dark matter on Lyman-alpha forest”. In: *APS April Meeting Abstracts*. Vol. 2024. APS Meeting Abstracts, T12.007, T12.007.

Low, Ryan, Adhikari, Rakshak, Medvedev, Mikhail, Vogelsberger, Mark, et al. Mar. 2025. “Effects of Inelastic Two-Component Dark Matter in Subhalo Formation and Composition”. In: *APS Global Physics Summit Abstracts*. Vol. 2025. APS Meeting Abstracts, R21.005, R21.005.

Low, Ryan and Medvedev, Mikhail. Nov. 2025. “Eigenmodes in an ultrarelativistic pair QED-plasma”. In: *APS DPP Meeting Abstracts*. Vol. 2025. APS Meeting Abstracts, BP13.038, BP13.038.

PROFESSIONAL MEMBERSHIP

2020 - present	American Physical Society	DAP, DCOMP
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SKILLS

Python	9+ yrs
C/C++	9+ yrs
Linux	9+ yrs
Java	8+ yrs
Mathematica	7+ yrs
HPC/slurm	5+ yrs

SKILLS

Redeker Scholarship	2024
E. E. Slossen Award	2022 - 2023