

SKILLS

Python	7+ yrs
C/C++	7+ yrs
Linux	7+ yrs
Java	6+ yrs
Mathematica	5+ yrs
MPI	3+ yrs

RYAN LOW

Physics Ph.D. Candidate

CONTACT

Department of Physics and
Astronomy
Lawrence, KS 66046 USA

+1 951 318 3421
rtlow@ku.edu
rtlow.github.io

EDUCATION

PhD. Physics. (Expected Defense: July 2026)
University of Kansas

2020 - Present

My current research is using Hydrodynamical cosmological simulations to constrain self-interacting dark matter models. Performing these simulations requires working in a high performance computing cluster, while 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. Results are achieved through a combination of well-studied summary statistics, deriving new observables using machine learning methods, and forward modeling to produce mock observations.

B. Sc. Physics. (Cum Laude/Highest Distinction)
University of California, San Diego

2016 - 2020

The topic for my Bachelor's thesis was followup observations and classification of low mass star candidates found in the LaTE-MoVeRS proper motion catalog.

PUBLICATIONS

Structure Formation under Inelastic Two-Component Dark Matter: Halo Statistics and Matter Power Spectra in the High- z Universe

Ryan Low, Rakshak Adhikari, Jonah C. Rose, Stephanie O'Neil, Mikhail V. Medvedev, Paul Torrey, Mark Vogelsberger 2025 MNRAS (Submitted)
The results of the first suite of hydrodynamic inelastic two-component dark matter cosmological simulations.

Spectroscopic Confirmation of an M6 Dwarf Companion to the Nearby Star BD-08 2582

Ryan Low, Adam J. Burgasser, Céline Reylé, Roman Gerasimov, Chih-Chun Hsu, and Christopher A. Theissen 2021 Res. Notes AAS Volume 5, Issue 2, id.26.
Reporting the observation and spectroscopic classification of a dwarf binary 15 pc from the sun.

Inferring Warm Dark Matter Masses with Deep Learning

Jonah C. Rose, Paul Torrey, Francisco Villaescusa-Navarro, Mark Vogelsberger, Stephanie O'Neil, Mikhail V. Medvedev, Ryan Low, Rakshak Adhikari, and Daniel Angles-Alcázar 2024 MNRAS Volume 527, Issue 1



AWARDS

Redeker Scholarship

2024

Awarded for high academic achievement in the PhD program

E. E. Slossen Award

2022-2023

Awarded for service as an Outstanding Graduate Teaching Assistant

Endothermic self-interacting dark matter in Milky Way-like dark matter haloes

Stephanie O'Neil, Mark Vogelsberger, Saniya Heeba, Katelin Schutz, Jonah C. Rose, Paul Torrey, Josh Borrow, **Ryan Low**, Rakshak Adhikari, Mikhail V. Medvedev, Tracy R. Slatyer, and Jesús Zavala 2023 MNRAS Volume 524, Issue 1

Introducing the DREAMS Project: DaRk mattEr and Astrophysics with Machine learning and Simulations

Jonah C. Rose, Paul Torrey, Francisco Villaescusa-Navarro, ..., **Ryan Low**, ..., Julianne J. Dalcanton, David Spergel 2025 ApJ Volume 982, Issue 2

The Initial Mass Function Based on the Full-sky 20-pc Census of ~3,600 Stars and Brown Dwarfs

J. Davy Kirkpatrick, Federico Marocco, Christopher R. Gelino, ..., **Ryan Low**, ..., David Zurek, The Backyard Worlds: Planet 9 Collaboration 2025 ApJS Volume 271, Issue 2, id.55

PRESENTATIONS

Effects of Inelastic Two-Component Dark Matter in Subhalo Formation and Composition

American Physical Society Global Physics Summit 2025

Presenting results on the first simulation suites using inelastic two-component dark matter and IllustrisTNG physics. This parameter space exploration is the first step towards a robust understanding of how inelastic dark physics affects baryonic processes on subgalactic scales.

Effects of Inelastic Dark Matter on the Lyman- α Forest

American Physical Society April Meeting 2024

Presenting results on the effects of inelastic two-component dark matter on the matter power spectrum, halo mass function, and other halo statistics using the `Arepo` simulation code with IllustrisTNG physics, with potential resolutions of the small scale problems in cosmology.

Numerical Studies of Inelastic Dark Matter Cosmology

American Physical Society April Meeting 2023

Presenting results on the effects of inelastic two-component dark matter on the matter power spectrum and halo mass function using the `Arepo` simulation code with IllustrisTNG physics.

Lyman-alpha Forest Studies of Cosmological Simulations with Inelastic Two-Component Dark Matter (2cDM)



Presenting preliminary results on the effects of inelastic two-component dark matter on the high redshift matter power spectrum using the `Arepo` simulation code with IllustrisTNG physics.

RESEARCH EXPERIENCE

Cosmological Simulations of Two-Component Dark Matter 2020-Present

Advisor - Dr. Mikhail Medvedev

Using AREPO with IllustrisTNG physics to explore the properties of inelastic dark matter self interactions.

Observation and Analysis of KAST-Red Spectra 2018-2020

Advisor - Dr. Adam Burgasser

Observations of low mass stars and brown dwarfs. Developing an analysis pipeline from observation to data reduction to classification for low resolution optical spectroscopy.

Data Reduction and Analysis of IRTF-SpeX Spectra 2017-2018

Advisor - Dr. Adam Burgasser

Using standard tools to analyze and classify infrared spectra.

TEACHING ASSISTANTSHIP

Graduate Problem Solving 2024-Present

University of Kansas

Modern Optics Laboratory 2022-2024

University of Kansas

Mechanics Laboratory 2020-2022

University of Kansas

Quantum Mechanics I 2020

University of California, San Diego