Abdullah Alshaffi

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Education

PhD Astrophysical and Planetary Sciences Aug 2022 - May 2027
University of Colorado Boulder

Master of Science in Physics Sep 2019 - May 2022
University of Massachusetts Dartmouth, Dartmouth, Massachusetts

Bachelor of Science in Astronomy, Mathematics Aug. 2010 - April 2015
King Abdulaziz University, Jeddah, Saudi Arabia

Publications

Super-Chandrasekhar Mass Type Ia Supernova Event from the Double-Degenerate Channel, **A Alshaffi**, M Ferrari, R Fisher, S Yoshida, B Roy *In Preparation.*

Talks & Summer Schools

- Talk for 239th AAS meeting, 10 January, Canceled
  Title-Type Ia Supernovae from Differentially-Rotating Super-Chandrasekhar Mass White Dwarf Mergers
- IVC astrostatistics and machine learning summer school 2021

Students Mentored

Mckenzie Ferrari (B.S. Umass Dartmouth)

- On super-Chandrasekhar mass Type Ia Supernova event from the double-degenerate channel.

Professional Experience

Graduate Research Assistant in the Astrophysical and Planetary Sciences at University of Colorado Boulder. Summer - Fall 2023

Teaching Assistant in the Astrophysical and Planetary Sciences at University of Colorado Boulder. Spring 2023

- ASTR 1030: Accelerated Introductory Astronomy I.

Teaching Assistant in the Astronomy Department at King Abdulaziz University. 2016 - 2017

- Astronomy 201 Lab.
- General Astronomy (Assistant Instructor)

Skills

- **Programming languages:** Python, Mathematica, Fortran, IDL, and C++.
- **Operating systems:** Mac OS, Linux, Windows.
- **Software & Skills:** LaTeX, Git, and OriginLab.
- **Hydrodynamics/MHD Simulation Code:** Adaptive mesh refinement code FLASH, and the Magnetic Flux Eruption (MFE) code.
- **Stellar Evolution Code:** MESA
- **Nuclear network code:** Torch (By Frank Timmes).
- **Radiation transport code:** SuperNu (By Van Rossum and Ryan Wollaeger).
- **HPC Skills:** MPI, Open MP.

- **HPC Systems:** Pleiades Supercomputer (NASA), TACC-Stampede2, NCAR (Derecho – Casper – Cheyenne), and Carnie (UMass Dartmouth)
- **Visualization & Machine Learning**: yt, Tensorflow, and HDBSCAN
- **Observing:**
  - Set up 8 & 6 inch telescopes with tracking (MEADE).
  - SSP-5 Photomultiplier UBV
  - Coronado H-Alpha Solar Telescopes
  - Planetarium at King Abdulaziz University
  - ST-2000XM CCD Camera

Research Experiences

Super-Chandrasekhar mass Type Ia supernova event from the double-degenerate channel.
University of Massachusetts Dartmouth
Mentored by Prof. Robert Fisher.

- I led a research effort to explore the possibility of differentially-rotating carbon-oxygen white dwarf mergers as stellar progenitors of superluminous type Ia supernovae. In this work, I used a massively-parallel adaptive mesh refinement code called FLASH (Fryxell et al 2000) to simulate super Chandrasekhar mass models generated by our collaborator, Prof. Shin'ichirou Yoshida from the University of Tokyo (Japan). The data stored in passive tracer particles generated in our FLASH runs were used to compute for nucleosynthetic yields through Torch, a general nuclear network code by Frank Timmes. The nucleosynthetic yields were then used to obtain synthetic spectra through the LTE radiative transfer code, SuperNu. The results that we obtain from SuperNu enable us to compare the synthetic spectra from our pure detonation models against superluminous SNe Ia events such as SNLS-03D3bb and sub-Chandrasekhar and near-Chandrasekhar white dwarf models.

Data-Driven Magnetohydrodynamic Simulations of an Eruptive Solar Active Region.
University of Colorado Boulder
Mentored by Dr. Maria Kazachenko.

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Relevant Coursework

Physics: Classical Mechanics, Electromagnetism, Quantum Mechanics, Statistical Mechanics and Thermal Physics, General Relativity, Mathematical Physics.

Astronomy: Atomic and Molecular Processes, Radiative/Dynamic Processes, Astrophysical & Space Plasmas, Mathematical Methods, Galaxies, Intro Fluid Dynamics, Observations Data Analysis, & Statistics, High-energy Astrophysics, Stellar Interior, Computer Applications in Astronomy, Variable & Binary Stars, Celestial Mechanics, Solar Physics.

Mathematics: Numerical Partial Differential Equations, Calculus, Differential Equations, Linear Algebra, Complex Analysis, Real Analysis.

Committee

Welcome and Social	2023-2024
Observatory	2022-2023

Languages

Arabic (Native)
English (Advanced)

Outreach

Member of astronomical activity at King Abdulaziz University. 2012 - 2015

Presenting lessons and presentations using Planetarium at King Abdulaziz University for students visiting from schools.

Volunteer in Space Week. 2013

Extracurricular Activities

Backpacking

- I love hiking, especially those that require hard effort. Also, I like camping in the forests and deserts.