Kai van Brunt

kav@mit.edu | 1-626-862-3426

EDUCATION

Massachusetts Institute of Technology Cambridge, MA | Class of 2025

Candidate for B.Sc. in Physics GPA: 5.0/5.0

Relevant Coursework: Parallel Computing and Scientific Machine Learning, Functional Analysis, Abstract Algebra, Nonlinear Dynamics, Quantum Physics, Statistical Physics, Real Analysis, Differential Equations

RESEARCH

MIT PLASMA SCIENCE AND FUSION CENTER

Energy Dissipation in Sheared Magnetic Fields Jun 2022 - Dec 2022

- Investigated effect of shear magnetic field on turbulence and electron heating in kinetic plasmas through simulations using the spectral code Viriato.
- Learned and applied MHD and kinetic theory in reviewing relevant literature, setting up simulations, and interpreting results.
- Presented at the undergraduate poster session at APS-DPP 2022.

Equilibrium Structures of Ions in a Penning Trap Sep 2021 - May 2022

- Wrote Julia code which performs n-body simulations to investigate dynamics and equilibrium states of ions in electromagnetic traps.
- Created animations and visualizations to help analyze ion motions.
- Implemented particle pushing algorithm and Barnes-Hut algorithm to improve simulation speed and accuracy.
- Presented at MIT Nuclear Science and Engineering Research Expo.

SUMMER SCIENCE PROGRAM Jun 2020 - Jul 2020

- Imaged asteroid 2011 XZ1 using research-grade telescopes, performed astrometry and photometry on images, coded orbit determination program using Python.
- Published in Minor Planet Circular.

EXTRACURRICULARS

ARCTURUS Sep 2022 - Present

- Part of EE (electrical engineering) subteam for Arcturus, a team building an autonomous surface vehicle.
- Working on electronics layout with a focus on interfacing overcurrent protection, power distribution terminal, relays, motor drivers, and other components; designing custom PCBs to integrate these components.

PHYSICS MENTOR Sep 2022 - Present

- Providing peer tutoring and general support to students taking first- and second-year physics subjects.

SOLAR ELECTRIC VEHICLE TEAM Sep 2021 - Jan 2022

- Part of MechE subteam for SEVT, a team building a fully solar-powered electric vehicle.
- Used SolidWorks to design, model, and perform feasibility testing on door and hinge for multi-occupancy vehicle currently being designed.
- Modeled brakes system using MATLAB and implemented improvements to brakes system based on results.

SKILLS

Programming Languages: Python, Julia, Java, MATLAB

Technology: SolidWorks, Git, bash, LaTeX, Microsoft Office, Adobe Suite

Languages: English (native), Chinese (professional working proficiency)