PATRICK D. ALEO

CURRICULUM VITÆ

PH.D. CANDIDATE IN ASTRONOMY   University of Illinois at Urbana-Champaign

CONTACT

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EDUCATION

The University of Illinois at Urbana-Champaign   *Aug. 2018 – Present*
Pursuing Ph.D. in Astronomy

The University of Texas at Austin   *Aug. 2014 – Dec. 2017*
Completed B.S. Astronomy, B.S. Physics

REFEREED PUBLICATIONS

4 First-Author · 15 Total Publications · 1 Preprint · 212 Citations · h-index 7 · i10-index 7   *See*: Publications

SELECTED RESEARCH EXPERIENCE

THE UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Advisor: Dr. Gautham Narayan   Graduate Assistant, Illinois Transient Science Group

Photometric Classification for the Young Supernova Experiment (YSE)   *Sep. 2020 – Present*
Leading the first Data Release (DR1) for the Young Supernova Experiment (YSE) survey's first ∼2 years of operation. Prepared light curve forced photometry data, generated cutting-edge YSE+ZTF simulations, and trained hybrid physics-VAE model *ParSNIP* for multi-band time-evolving photometric classification of ∼2000 YSE-observed transients including type Ia supernovae (SNe), core-collapse SNe, and anomalies. First paper to demonstrate SNe photometric classifier trained exclusively on simulations can perform well on real data. ***Publication:*** **Aleo** et al. 2022 (in prep)

SNAD Transient Miner: Finding Missed Transient Events in ZTF DR4   *Oct. 2021 – Present*
Pioneered a new method to calculate light curve features of simulations and use k-D trees and PCA to search for nearest matching light curve features of missed transient events in ZTF Data Releases. Found 11 missed transients (7 supernovae, 4 active galactic nuclei candidates). ***Publication:*** Aleo et al. 2022, New Astronomy

Real-Time Anomaly Detection   *Jan. 2020 – Present*
Built a real-time anomaly detection filter for ZTF broker ANTARES using machine learning techniques to detect and report transient events. Adopting techniques to prioritize objects for spectroscopic follow-up. Highlights include a microlensing event, supernovae (SN Ia, II, IIn, etc.), and a luminous red nova in M31.

Advisors: Dr. Donna J. Cox, Dr. Matthew J. Turk   Advanced Visualization Lab, NCSA

Clustering Methods for Cinematic Astrophysical Data Visualization   *Jan. 2019 – Aug. 2020*
Developed Python pipeline, Estra, to enable scientists in creating their own production-quality visualizations in Houdini FX for publication, simulation testing, or public outreach using machine learning clustering algorithm results. Discovered and visualized "physically interpretable" clusters in the Moon-forming synestia simulation. ***Publication:*** Patrick D. Aleo et al. 2020, Astronomy and Computing

PROFESSIONAL AFFILIATIONS & SERVICE

The LSST Dark Energy Science Collaboration (DESC)   The ANTARES Project
The LSST Transient & Variable Stars Collaboration (TVS)   The Young Supernova Experiment (YSE)
The Advanced Visualization Lab (AVL) at NCSA   SuperNova Anomaly Detection (SNAD) Collab.
Center for AstroPhysical Surveys (CAPS) at NCSA   Supernova Machine Learning Topical Team (SMaLTT)
Reviewer for The Astronomical Journal

HONORS, AWARDS & FELLOWSHIPS

$30000, *Center for AstroPhysical Surveys (CAPS) Fellow* **(2x)**   *Aug. 2020 - Aug. 2022*
$10000, *Fiddler Innovation Scholar*   *Jan. 2020 – May 2020*
$1000, *Summer Digital Methods Fellow*   *Jun. 2020*