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ANDREW K. SAYDJARI

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RESEARCH INTERESTS

I work at the interface of **data science** and **astrophysics**, developing new statistical tools to analyze large datasets. In terms of methods, I am intrigued by the low-SNR limit, **uncertainty quantification**, and blind signal separation problems. In terms of astrophysics, I strive to better understand the **chemistry** of **interstellar dust**.

POSITIONS

NASA Hubble Fellow: Princeton University, Department of Astrophysical Sciences 2024-2027

EDUCATION

Harvard University: PhD in Physics 2018-2024
Advisor: Douglas Finkbeiner
Thesis: Statistical Models of the Spatial, Kinematic, and Chemical Complexity of Dust

Yale University: BSc/MSc in Chemistry, BSc in Mathematics 2014-2018
Thesis: Optimizing the Nickel-Catalyzed Carboxylation of Aryl Halides

SELECTED AWARDS & HONORS

NASA Hubble Fellowship 2024-2027
Eric R. Keto Prize (Harvard), Best PhD thesis in theoretical astrophysics 2024
Best Astrostatistics Student Paper Award (ASA/AIG) 2022
Bok Center Certificate of Distinction in Teaching (Harvard) Fall 2021
NSF Graduate Research Fellowship (USA) 2018
Hertz Fellowship Finalist 2018, 2019
Howard Douglass Moore Prize (Yale), Chemistry's highest honor, awarded to a single graduating undergrad 2018
Barry Goldwater Scholar (USA) 2017
Phi Beta Kappa 2017
DAAD-RISE Fellowship (Yale/Germany), Research internship exchange 2016

PROFESSIONAL ACTIVITIES & SERVICE

Architect in SDSS-V
APOGEE pipeline development (Architect status conferred Aug 2024) Jan 2022 – present
Harvard Astronomy Department
(1/2) Student Representatives to Faculty Search Committee (Elected) Jan - Mar 2023
Organizer for Student Faculty Forum (StuFF) 2022 - 2023
Institute for Artificial Intelligence and Fundamental Interactions (IAIFI)
Computing Committee June 2022-present
American Astronomical Society
Chambliss Poster Judge (AAS 240, AAS 241) June 2022-present
Manuscript Referee
American Astronomical Society Journals (ApJ) 2023-present
Journal of Open Source Software (JOSS) 2024-present

PUBLICATIONS

I am an author on **20+ papers** that have **588+** citations (h-index=12). This includes:
9+ papers as **(co-)lead author** with 222+ citations
5+ papers with **significant contributions** with 203+ citations

See my Publication List for details. My ORCID is 0000-0002-6561-9002.
Most of my papers can be found online on ADS, though citations outside astronomy are missing.

SUPERVISION & MENTORSHIP

I have (co-)supervised/mentored **4 students**:

Graduate

1. Ana Sofía Uzsoy (Astronomy, Harvard) Fall 2022-Present
   Component Separation of Lyman Alpha Emitters in DESI (w/ Doug Finkbeiner)

Undergraduate

3. Stephanie Yoshida (Astronomy, Harvard) Fall 2023-Present
   Kinetic Tomography of the Intermediate Velocity Arch (w/ Catherine Zucker & Doug Finkbeiner)
2. Devisree Tallapaneni (Physics & Statistics, Cornell) Summer 2023-Present
   Quantifying the Filamentary ISM: Statistical Reconstructions of Reality (w/ Eric Koch & Doug Finkbeiner)
1. Ken Michalek (Computer Science, Harvard Extension School → MIT Lincoln Lab) 2020-2021
   Online Blind Deconvolution for Educational Astronomy (w/ Dominic Pesce & Allyson Bieryla)

TEACHING

I care passionately about teaching and love ideating new ways of explaining difficult concepts. I emphasize the development of hands-on teaching methods, incorporating active learning through experiment and data-based exploration. I view creating an inclusive atmosphere, in which all students can comfortably learn, as a top priority.

Harvard University, Teaching Fellow Fall 2021
Solid State Physics, Lecture, Undergrad/Grad, 27 students, w/Prof. Julia Mundy
Feedback: Student Evaluations

Yale University, Peer Tutor 2015-2018
Physical Chemistry, Lab, Undergrad, 30 students, w/Prof. Patrick Vaccaro
Physical Chemistry II, Lecture, Undergrad, 30 students, w/Prof. Patrick Vaccaro
Freshman Organic Chemistry II, Lecture, Undergrad, 100 students, w/Prof. Alanna Schepartz
Sophomore Organic Chemistry I, Lecture, Undergrad, 120 students, w/Prof. Jonathan Ellman

SPLASH/SPROUT @ Yale, Middle School 2015-2018
Peeling Back the Layers of Solar Cells (30 students), Metal Mania: Simple Models of the Material World (4 students), Destressing Tensors (7 students), Abstract Algebra: Questions Teachers Didn't Answer (60, 75 students), Origins of Life: A Chemist's Perspective (16, 35 students)

SELECTED PRESENTATIONS

I have given **25+ public science talks**. See my Talk List for more details. Highlights include:

Invited Conference Talks

JSM 2022: Astrostatistics Interest Group: Student Paper Award August 2022
Photometry on Structured Backgrounds: Local Pixelwise Infilling by Regression

Contributed Conference Talks

Sloan Digital Sky Survey V (SDSS-V) Collaboration Meeting August 2023
A New MWM Pipeline: Separating APOGEE Spectra into Components

Statistical Challenges in Machine Learning and Astrophysics (SCMA) VIII June 2023
Measuring the 8621 Å Diffuse Interstellar Band in Gaia DR3 RVS Spectra:
Obtaining a Clean Catalog by Marginalizing over Stellar Types

RAS Specialist Discussion: 1D ML March 2023
Measuring the 8621 Å Diffuse Interstellar Band in Gaia DR3 RVS Spectra

DECam at 10 Years Workshop September 2022
The Dark Energy Camera Plane Survey 2 (DECaPS2): More Sky, Less Bias,
and Better Uncertainties

AAS 240: Computation, Data Handling, Image Analysis June 2022

The DECam Plane Survey (DECaPS2): Optical photometry of 3.3 billion stars in the southern Galactic plane

Seminars, Lunch Talks, & Journal Clubs

UWSeattle: Astro Lunch — April 2023
Probabilistic Component Separation: Deconstructing Photometric and Spectroscopic Pipelines

University of Toronto: Statistics and MachIne LEarning (SMILE) Journal Club — February 2022
Photometry on Structured Backgrounds

IAS: Pan-Experiment Galactic Science Group — July 2021
Learning from ISM Texture using the Wavelet Scattering Transform

LPENS: AstroLunch — December 2020
Scattering Transform Methods: Applications to Galactic Dust

OUTREACH & ENGAGEMENT

Public Science Writing

MathStatsBites: TheSequencer, CycleStarNet, SCMA8, NestedSampling — 2022-2023
LightSound Workshop, Soldering Solar Eclipse Sonification Instruments — Summer 2023
Cambridge Science Festival, MIT Museum Presentation Volunteer — Fall 2022
Latino Initiative Program, Instructor — Summer 2021- Summer 2023
Harvard Observation Project, Software Mentor — 2020-2021

PRESS

DECaPS2 Release: WSJ, Wired, AP, CNN, Register, Salon, Forbes, Space.com, AAS Nova — January 2023
Grad Student Highlight: Labroots — November 2022
Machine Learning & Interstellar Dust Clouds: Abstract: The Future of Science — December 2020

SELECTED RESEARCH SKILLS

Computational

I am a strong advocate of both open-source code and data, and I insist on public reproducibility of all plots in my work (see my Zenodo deposits accompanying my papers).

Developer: Julia (4 years, primary), Python (7 years), MATLAB (3 years) [Github]
Developed pipelines and managed >100k core-h runs in both Julia and Python
Managed daily simultaneous multi-instrument measurements in MATLAB

Public Packages: LowRankOps.jl, KryburyCompress.jl, CloudCovErr.jl, CloudClean.jl, EqWS.jl, crowdsource

Laboratory

Fabrication: EBL, RIE, ALD, Photolithography, Thermal/E-beam/Sputtering Deposition
Characterization: (S)TEM/EDX, FIB, SEM, AFM
Spectroscopy: Terahertz-Time Domain, SPR, XPS, NMR (1H, 13C, 31P, NOSEY), EPR