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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. In terms of astrophysics, I strive to understand the spatial, kinematic, and chemical distribution 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

International Astronomical Union (IAU) Thesis Prize: Division H (Galactic/ISM), Best PhD thesis 2025
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

PUBLICATIONS

I am an author on **40+ papers** that have **1261+** citations (h-index=16). This includes:
12+ papers as **(co-)lead author** with 369+ citations
6+ papers with **significant contributions** with 286+ 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.

PROFESSIONAL ACTIVITIES & SERVICE

Collaborations, Committees, & Leadership:
Architect for SDSS-V, APOGEE pipeline development Jan 2022 - present
Leadership Council, AI/ML Science Interest Group (NASA Cosmic Origin Program) Fall 2025 - present
Computing Committee, Institute for Artificial Intelligence and Fundamental Interactions (IAIFI) 2022 - 2024
Faculty Search Committee, (1/2 elected) Student Representatives (Harvard Astronomy) Jan - Mar 2023

Review:
External System Readiness Review (ESRR) Panel for the Fornax Initiative (NASA Cloud Compute) Fall 2025
NSF Astronomy & Astrophysics Research Grant (AAG) Panel Spring 2025
AAS Chambliss Poster Judge (AAS 240, AAS 241, AAS 245) Summer 2022 - present

Journal Referee for ApJ, AJ, A&A, and Journal of Open Source Software (JOSS) 2023 - present

Conference and Seminar Organization:
Student Faculty Forum (StuFF) Co-organizer, Harvard Astronomy 2022 - 2023

SUPERVISION & MENTORSHIP

I have (co-)supervised/mentored **8 students**:

Graduate:

4. Christian Kragh Jespersen (Astrophysics, Princeton) Spring 2025 - Present
   Constraining DIB carrier geometries via rotational spectra forward modeling
3. Rhys Seeburger (Astronomy, MPIA→ LJMU Postdoc) Spring 2025
   Analyzing SB2s in APOGEE x Gaia (w/ Hans-Walter Rix)
2. Theo O'Neill (Astronomy, Harvard) Fall 2024 - Present
   3D High Altitude Clouds (IVCs) and DESI Na Tomography (w/ Catherine Zucker)
1. Ana Sofía Uzsoy (Astronomy, Harvard) Fall 2022 - Summer 2025
   Component Separation of Lyman Alpha Emitters in DESI (w/ Doug Finkbeiner)

Undergraduate:

4. Zack Steine (CS & Statistics, University of Toronto Scarborough → Veeva Systems) Summer 2024 - Winter 2024
   SBI for DESI Stellar Parameters (w/ Josh Speagle)
3. Devisree Tallapaneni (Physics & Statistics, Cornell → OSU Grad) Summer 2023 - Present
   Quantifying the Filamentary ISM: Statistical Reconstructions of Reality (w/ Eric Koch)
2. Stephanie Yoshida (Astronomy, Harvard → Milwaukee Brewers) Fall 2023
   Kinetic Tomography of the Intermediate Velocity Arch (w/ Catherine Zucker)
1. Ken Michalek (Computer Science, Harvard Extension School → MIT Lincoln Lab) 2020 - 2021
   Online Blind Deconvolution for Educational Astronomy (w/ Dominic Pesce & Allyson Bieryla)

Programs:

Polaris: Mentoring Harvard Physics Undergraduates (3 students) 2021 - 2024

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 **53+ talks (14+ invited talks/colloquia)**. See my Talk List for more details. Recent highlights include:

Invited Colloquia

NMSU Colloquium November 2025
Spectral Shadows of Structure at Scale: Chemokinematic Cartography of the Milky Way

UW-Madison Colloquium — March 2025
Mapping Milky Way Dust in n-Dimensions
NYU CCPP Seminar — November 2024
The Spatial, Kinematic, and Chemical Complexity of Dust

Invited Talks

AAS 247: PRIMA Special Session — January 2026
PRIM(All): An All-Sky, Polarized, FIR Dust Map and Point-Source Catalog
Princeton Astrophysical Sciences Advisory Council Meeting — May 2025
Galactic Cartography: Dust in 3D and Beyond
Roman GPS Community Workshop — February 2025
Optimizing the Galactic Plane Survey Filter Selection
Galactic Science with the Nancy Grace Roman Space Telescope — June 2024
The DECam Plane Survey as a Roman Galactic Plane Survey Pathfinder

Contributed Conference Talks

Dusty Universe: The 5th Pan-Dust Conference — June 2024
Correlations between Extinction Features across Wavelength Scales:
Realizing Diffuse Interstellar Bands as Chemical Tracers
JuliaCon Global — July 2025
Building an End-to-End Spectral Reduction Pipeline for APOGEE
Interstellar Institute #7: Interstellar Physics Across Scales — July 2025
Reconstructing the 3D+1V Velocity Field of the Milky Way from Dust Absorption
Sloan Digital Sky Survey V (SDSS-V) Collaboration Meeting — June 2025
Mapping ISM Chemistry and Kinematics with APOGEE DIBs
ApogeeReduction.jl: An APOGEE Reduction Pipeline for the AS5 Era
PRIMA and the Future of Far-Infrared Science — May 2025
The Case for A PRIMA All-Sky Polarized Dust Map (and Point Source Catalog)
New Computational Methods in Milky Way Dynamics and Structure @ Ringberg — July 2024
Bayesian Component Separation for Ground Based Spectra: Transforming Diffuse
Interstellar Bands into Precision Kinematic Tracers
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 DECam Plane Survey 2 (DECaPS2): More Sky, Less Bias, and Better Uncertainties

Seminars, Lunch Talks, & Journal Clubs

Columbia: Pizza Chalk Talk — February 2025
The Spatial, Kinematic, and Chemical Complexity of Dust
IAS: Bahcall Lunch — November 2024
The Highest Angular Resolution 3D Dust Map

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

GRANT SUPPORT & TELESCOPE TIME

5. Certum: Multiband Webb Images in the Inner Galaxy for the Roman Galactic Plane Survey — 2025 - 2026
Co-Investigator (PI: Schlafly) — STScI (JWST Cycle 4 Director's Discretionary Time)

4. Topological Mapping of Super bubbles and ISM Structures with JWST — 2025 - 2027
Co-Investigator (PI: O'Neill), $105,000 — STScI (JWST Cycle 4 Archival)

3. A Flexible Open-Source Framework for Rapid Stellar Classification in the Era of Roman — 2025 - 2027
Co-Investigator (PI: Zucker), $388,000 — NASA (ROMAN24-ROSES)

2. A Next-Generation Crowded-Field Stellar Photometry Tool for Roman — 2025 - 2027
Collaborator (PI: Smercina), $981,000 — NASA (ROMAN24-ROSES)

1. Inferring Kinematic and Chemical Maps of Galactic Dust — 2024 - 2027
PI: Saydjari, $471,000 — STScI (NHFP Hubble)

PRESS

IAU Thesis Prize: CFA, Princeton, IAU — June 2025
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 (5 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