ANDREW K. SAYDJARI

Graduate Student | Harvard Physics

andrew-saydjari.github.io | andrew.saydjari@cfa.harvard.edu | he/him/his

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**.

EDUCATION

Harvard University: PhD in Physics   2018-2024
   Advisor: Douglas Finkbeiner
   Thesis: Statistical Models of the Spatial 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

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

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

PUBLICATIONS

I am an author on **19+ papers** that have **364+** citations (h-index=10). This includes:
   8+ papers as **(co-)lead author** with 160+ citations
   5+ papers with **significant contributions** with 165+ 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
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   Jan 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 (3 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, 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