

# ANDREW K. SAYDJARI

Graduate Student | Harvard Physics

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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**.

## EDUCATION

<b>Harvard University:</b> PhD in Physics	2018-2024
Advisor: Douglas Finkbeiner	
Thesis: Statistical Models of the Spatial and Chemical Complexity of Dust	
<b>Yale University:</b> 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

<b>Harvard Astronomy Department</b>	
(1/2) Student Representatives to Faculty Search Committee (Elected)	Jan - Mar 2023
Organizer for Student Faculty Forum (StuFF)	2022 - 2023
<b>Institute for Artificial Intelligence and Fundamental Interactions (IAIFI)</b>	
Computing Committee	June 2022-present
<b>American Astronomical Society</b>	
Chambliss Poster Judge (AAS 240, AAS 241)	June 2022-present
<b>Manuscript Referee</b>	
American Astronomical Society Journals (ApJ)	2023-present

## PUBLICATIONS

I am an author on **19+ papers** that have **441+** citations (h-index=11). This includes:

**8+ papers** as (co-)lead author with 194+ citations

**5+ papers** with **significant contributions** with 197+ citations

See my [Publication List](#) for details. My ORCID is [0000-0002-6561-9002](https://orcid.org/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 Sofia 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

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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

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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  
Learning from ISM Texture using the Wavelet Scattering Transform  
LPENS: AstroLunch  
Scattering Transform Methods: Applications to Galactic Dust

July 2021  
December 2020

## OUTREACH & ENGAGEMENT

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### 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

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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

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### 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](#), [CloudClean.jl](#), [EqWS.jl](#), [crowdsourcing](#)

### 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