

# Andrew K. Saydjari

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## OBJECTIVE

To work at the interface of data science and astrophysics in pursuit of a Ph.D. and career in academic research. Research interests include wavelet transforms, non-gaussianity, turbulence in the interstellar medium, and stellar feedback. My ideal day is playing with data and discovering hidden knowledge within. My experimental background affords unique insight into data acquisition which further informs my data analysis skills.

## EDUCATION

- 2018 – 2024 **Harvard University**  
PhD Physics  
Finkbeiner Group  
GPA: 4.0
- 2014 – 2018 **Yale University**  
BS/MS Chemistry & BS Mathematics  
7(8) Physics(Chemistry) Grad Courses  
GPA: 3.93
- 2000 – 2014 **Lincoln High School, WI**  
13 Advanced Placement Courses (5/5)  
2 Univ. Wisconsin Courses  
GPA: 4.00

## AWARDS

### NATIONAL

- 2019 Hertz Finalist  
2018 NSFGRFP Fellow  
2018 Hertz Finalist  
2017 Barry Goldwater Scholar

### UNIVERSITY

- 2018 Howard Douglass Moore Prize  
2017 Rosenfeld Science Scholar  
2016 DAAD/Tetelman/Bergin

## HONOR SOCIETIES

- 2017 Phi Beta Kappa  
2017 Sigma Xi  
2017 Alpha Epsilon Mu

## STANDARDIZED EXAMS

- GRE 880 Chemistry (94%), 870 Physics (81%)  
170 Quant (99%), 170 Verbal (97%)  
5 Writing (93%)

## OUTREACH

### Harvard Observation Project

AUG 2020 – PRESENT

ADVISOR

Running observation and data analysis sessions on the Clay telescope at Harvard for undergraduates. Jointly advised an extension school student on improving an FFT-based deconvolution algorithm (“Online Blind Deconvolution”) in PYTHON for short exposure imaging. Goal is to improve resolution of nearby binary stars and signal-to-noise for planetary transits.

### LitKit: Educational Fluorescence Microscopy Kit

DEC 2017 – JUN 2019 NON-PROFIT CO-FOUNDER

Developing a safe, cost-effective educational kit to transform a standard secondary school microscope into a fluorescent microscope. This technology allows live cell imaging, bringing dynamic cellular processes to life before nascent scientists. Lead designer of laser optics and mount to utilize an ordinary laser pointer for excitation.

## PUBLICATIONS

### GRADUATE

**Saydjari, A. K.**; Portillo, S.K.N.; Slepian, Z.; Kahraman, S.; Burkhart, B.; Finkbeiner, D.; Classification of Magnetohydrodynamic Simulations using Wavelet Scattering Transforms.  
[arXiv:2010.11963](#). **2020**.

Portillo, S.K.N.; Slepian, Z.; Kahraman, S.; **Saydjari, A. K.**; Burkhart, B.; Finkbeiner, D.; Accelerated 3PCF with FFTs.  
*in prep.* **2020**.

Alegria, L.D.; Böttcher, C.G.; **Saydjari, A. K.**; Pierce, A.T.; Lee, S.H.; Harvey, S.P.; Vool, U.; Yacoby, A.; High-Energy Quasiparticle Injection in Mesoscopic Superconductors.  
[arXiv:2005.00584](#). **2020**.

### UNDERGRAD

Charboneau, D.J.; Brudvig, G.W.; Hazari, N.; Lant, H.M.C.; **Saydjari, A. K.**; Development of an Improved System for the Carboxylation of Aryl Halides through Mechanistic Studies.  
[ACS Catal.](#) **2019**, *9*, 3228-3241.

McKee, A.; Solano, M.; **Saydjari, A. K.**; Bennett, C.J.; Hud, N.V.; Orlando, T.M.; A Possible Path to Prebiotic Peptides Involving Silica and Hydroxy Acid-Mediated Amide Bond Formation.  
[ChemBioChem](#). **2018**, *19*, 1-6. [VERY IMPORT. PAPER]

Wang, D.; Wagner, M.; **Saydjari, A.**; Wu, S.; Butt, H.; A Photoresponsive Orthogonal Supramolecular Complex Based on Host-Guest Interactions.  
[Chem. Eur. J.](#) **2017**, *23*, 2628-2634.

**Saydjari, A. K.**; Weis, P.; Wu, S.; Spanning the Solar Spectrum: Azopolymer Solar Thermal Fuels for Simultaneous UV and Visible Light Storage.  
[Adv. Energy Mat.](#) **2016**, *7*, 1601622. [COVER ARTICLE]

### HIGH SCHOOL

**Saydjari, A. K.**; Pietron, J. J.; Simpkins, B. S.; Electrochemical Deposition and Spectroelectro-chemical Response of Bromophenol Blue Films on Gold.  
[Electroanalysis](#). **2015**, *27*, 1960-1967.

**Saydjari, A. K.;** Long, J.; Dressick, W.; Simpkins, B.;  
Optical Interference Effect Corrections for Absorbance  
Spectra of Layer-by-Layer Thin Films Bearing Covalently  
Bound Dye.  
*Chem. Phys. Lett.* **2014**, *608*, 328-333.

## RESEARCH EXPERIENCE

Harvard Physics Department

**Prof. Douglas Finkbeiner**

AUG 2020 – PRESENT

GRADUATE

Designing and characterizing new statistics based on wavelets to capture non-gaussianity in the interstellar medium. Pushing to make these statistics robust enough to apply to observations in addition to simulations, helping to bridge the gap between theory and observation. These statistics will then be applied to infer the Mach numbers of observed dust clouds.

**Prof. Amir Yacoby**

JULY 2018 – AUG 2020

GRADUATE

Engineering and investigating topological states of matter. Key questions include unambiguous detection, quantifying "topological protection," and decoherence mechanisms. Experimental focus on Josephson phenomenon using InAs and HgTe quantum wells. Repaired dilution refrigerator. Simulated, fabricated, and characterized first zig-zag Josephson junctions.

Yale Physics Department

**Prof. Michel Devoret**

JAN 2018 – JUN 2018

UNDERGRAD

Designing, fabricating, and measuring novel 3D Josephson junction geometries. *In situ* fabrication of a completely enclosed junction to improve junction coherence times, reproducibility, and processibility.

Yale Chemistry Department

**Prof. Nilay Hazari**

AUG 2016 – MAY 2018

UNDERGRAD

Performing mechanistic studies on nickel catalyzed carboxylation of aryl halides using carbon dioxide. Designing low-valent metal traps for study of kinetics of precatalyst activation. Mechanistic studies will then be used to direct the development of highly efficient catalysts.

**Prof. Charles Schmuttenmaer**

SEP 2015 – MAY 2016

UNDERGRAD

Rebuilt terahertz spectrometer from scratch in pursuit of the first circular dichroism spectrum using terahertz-time domain spectroscopy.

Max Planck Institute for Polymer Research

**Dr. Hans-Jürgen Butt**

MAY 2016 – AUG 2016

UNDERGRAD

Designed and created an azopolymer-based solar thermal cell with record-breaking efficiency and gravimetric energy density. Calculated host-guest molecule geometries elucidating mechanism behind novel assemblies which lead to first photo-responsive orthogonal supramolecular systems.

Georgia Institute for Technology

**Prof. Nicholas V. Hud**

MAY 2015 – JUL 2015

UNDERGRAD

Reached record polypeptide lengths under prebiotically plausible conditions by examining a novel system which simultaneously explored the role of surfaces and mixtures on Early Earth. Elucidated the mechanism for observed unprecedented protection (with applications to food science). This work provided confirmation of plausibility of the peptide world hypothesis.

U.S. Naval Research Lab

**Dr. Blake Simpkins**

JUN 2014 – AUG 2014

HIGH SCHOOL

Achieved first direct electrochemical deposition of bromophenol blue on gold. Characterized film growth with respect to deposition variables and demonstrated electrochemical control of film optical states.

JUN 2013 – AUG 2013

HIGH SCHOOL

Fabricated and analyzed polyelectrolyte multilayer films using spectroscopy and microscopy. Analyzed spectra and developed a mathematical model for spectral correction.

## TEACHING EXPERIENCE

2015 – 2018 **Yale University Peer Tutor**

Physical Chemistry Lab/Lecture  
Organic Chemistry (Fresh/Soph)

2015 – 2018 **SPLASH/SPROUT@Yale**

Middle/High School Courses

### Course List

Peeling Back the Layers of Solar Cells

CLASS SIZE: 30

Metal Mania: Simple Models of the Material World

CLASS SIZE: 4

Destressing Tensors

CLASS SIZE: 7

Abstract Algebra: Questions Teachers Didn't Answer

CLASS SIZE: 60, 75

Origins of Life: A Chemist's Perspective

CLASS SIZE: 16, 35

## CONFERENCES

SPEAKER

2020 **APS: March Meeting**

Boulder, CO

2019 **APS: March Meeting**

Boston, MA

2017 **Gulf Coast Research Conference**

Rice University

*Best Presentation*

2017 **Ivy League STAR Competition**

*Award of Excellence*

2017 **Yale Research Symposium**

*Plenary*

2016 **National Collegiate Research Conference**

Harvard

#### POSTER PRESENTER

- 2019 **Center for Integrated Quantum Materials**
- 2016 **Yale Research Showcase**
- 2016 **Columbia Science Symposium**  
*Award of Excellence*
- 2015 **Yale Research Symposium**  
*Grand Prize*
- 2015 **GeorgiaTech Poster Session**
- 2014 **NRL Science Apprenticeship Conference**

#### EDITING

- 2017 Journal of Epsilon Alpha Mu Society  
Technical Editor
- 2016-2020 Max Planck Institute for Polymers  
Language Editor

#### LABORATORY SKILLS

##### Characterization

(S)TEM/EDX (Transmission Electron Microscopy)  
FIB (Focused Ion Beam)  
SEM-EDS (Scanning Electron Microscopy)  
AFM (Atomic Force Microscopy)/Profilometry

##### Fabrication

Electron Beam Lithography  
Reactive Ion Etching  
Thermal/Electron Beam Metal Deposition  
Atomic Layer Deposition

##### Electrochemistry

CV (Cyclic Voltammetry)  
Electrochemical Deposition  
In situ-Spectroelectrochemistry

##### DNA Science

Gel Electrophoresis  
PCR (Polymerase Chain Reaction)

##### Analytical

(U)HPLC-MS/MS  
GC/MEMS (Chemical Capacitor)  
GPC-SEC/FID

#### Spectroscopy

Terahertz-Time Domain  
SPR (Surface Plasmon Resonance)  
XPS (X-Ray Photoelectron Spectroscopy)  
NMR (<sup>1</sup>H, <sup>13</sup>C, <sup>31</sup>P, 1H-1H NOSEY)/EPR  
UV-vis-NIR/Fluorescence  
Reflectance/Diffuse/ATR-FTIR

#### Misc

Dynamic Light Scattering/Zeta Potential  
(Polarized) Optical Microscopy (Super Res)  
Confocal Microscopy/Optical Trapping  
Optical Contact Angle Measurement  
DSC (Differential Scanning Calorimetry)  
Elemental Analysis

#### COMPUTATIONAL SKILLS

##### Programming

Python  
Spark  
SQL  
LABVIEW

##### Numerical Packages

Kwant  
QuantumEspresso  
Gaussian09/16  
GAMESSUS

##### Data Suites

MATLAB  
Mathematica  
IgorPro  
Origin

##### Formatting Software

L<sup>A</sup>T<sub>E</sub>X  
AutoCAD/Inventor/Maya  
Chemissan/Avogadro

#### LANGUAGES

English (Native), French (6 yrs)