# VEDANT CHANDRA

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ORCID: 0000-0002-0572-8012 | Publications: ADS Library

## Professional Appointments

**Graduate Student, Center for Astrophysics | Harvard & Smithsonian** 2021–Present

**Summer Visiting Researcher, Max Planck Institute for Astronomy** 2022–Present

**Research Intern, Space Telescope Science Institute** 2020–2021

**Research Assistant, Johns Hopkins University** 2018–2021

## Education

**Harvard University** 2021–Present

- A.M., Ph.D. Astronomy & Astrophysics (intended)

**Johns Hopkins University** 2017–2021

- B.S. Physics & Applied Mathematics, minor in Space Sciences

## Awards & Honors

**James Mills Peirce Fellowship, Harvard University** 2021

**Chambliss Medal, American Astronomical Society** 2021

$\Sigma\,\Pi\,\Sigma$ 2020

**Summer Student Fellowship, JHU IDIES** 2020

**Provost's Undergraduate Research Award, JHU** 2019

**Dean's Undergraduate Research Award, JHU** 2019

**Dean's List 7/7 Semesters, JHU** 2017-2021

## Grant Allocations

**STScI JWST Discretionary Fund ($42,740)** 2020

- "The Initial Mass Function of Resolved Stellar Populations in the Local Group"
- PI: Mario Gennaro, Co-I: Vedant Chandra

**Various Undergraduate Research Grants ($13,500)** 2019-2020

- PI: Vedant Chandra, Co-Is: Nadia Zakamska, Hsiang-Chih Hwang, Kevin C. Schlaufman

## Invited Talks

**Wide Field Spectroscopy vs Galaxy Formation Theory** March, 2023

- "The Three-Phase Birth of the Milky Way".

**Disk Formation Workshop, UC Irvine** September, 2022

- "The Poor Old Heart of the Milky Way".

**ITC Luncheon, Harvard-Smithsonian CfA** September, 2022

- "A Ghost in Boötes: The Least Luminous Disrupted Dwarf Galaxy", video.

**Milky Way Meeting, MPIA Heidelberg** April, 2022

- "To 100 kpc and Beyond: The Outer Halo with RGB Stars".

**Online Meetings on Evolved Stars and Systems** December, 2021

- "Detection of Circumstellar Material and Rotation in a Runaway SNIa Donor", video.

**Institute for Advanced Study, Astrophysics Coffee** October, 2021

- "Circumstellar Material and Surface Rotation in a Runaway SNIa Donor"

**Space Telescope Science Institute, Summer Symposium** July, 2020

- "Fitting the Stellar Birth Function of Resolved Stellar Populations with Approximate Bayesian Computation", 19:30 onwards.

**Space Telescope Science Institute, Summer Symposium** August, 2019

- "White Dwarf Spectroscopy with Machine Learning", 21:00 onwards.

**Maryland Space Grant Consortium, Annual Symposium** July, 2019

- "White Dwarf Astronomy with Machine Learning".

## Poster Presentations

**237th Meeting of the American Astronomical Society** January, 2021

- "Resolved Stellar Populations in the Era of JWST and Roman", iPoster

**IDIES and MINDS Annual Symposium** October, 2020

- "Hunting for Metal-Poor Main-Sequence Stars in SDSS", awarded Best Poster.

**NASA HRP Investigators Workshop** January, 2020

- "Multivariate Analysis of Human Health and Performance in Spaceflight Simulation"

**IDIES Annual Symposium** October, 2019

- "Characterizing White Dwarf Spectra with Neural Networks"

**JHU DREAMS Conference** April, 2019

- "Hunting for Binary White Dwarf Stars with Spectroscopic Analysis"

## Selected Public Coverage

**Quanta Magazine** March, 2023

- "Astronomers Dig Up the Stars That Birthed the Milky Way"

**MPIA Press Release** December, 2022

- "Astronomers identify the ancient heart of the Milky Way galaxy"

**ScienceNews Magazine** November, 2022

- "A protogalaxy in the Milky Way may be our galaxy's original nucleus"

**Anton Petrov (YouTube)** October, 2022

- "Original Core of the Milky Way Galaxy Found Using Gaia Telescope"

**astrobites** August, 2022

- "The Haunting of Boötes' Backyard"

**ScienceNews Magazine** August, 2020

- "Paradoxically, white dwarf stars shrink as they gain mass"

**JHU Press Release** July, 2020

- "Johns Hopkins astrophysicists observe long-theorized quantum phenomena"

## Observatory Allocations

### Principal Investigator (14):

**Very Large Telescope, FLAMES/GIRAFFE, 75 hours** 2023
- "A Chemical Survey of the Milky Way's Ancient Heart".

**Magellan Observatory, MagE, 8 nights** 2022-2023
- "Surveying the Uncharted Outer Halo with MagE".

**MMT Observatory, Hectochelle, 4 nights** 2022-2023
- "Stealth Galaxies in the Outskirts of the Milky Way".

**Anglo-Australian Telescope, 2dF+AAOmega, 3 nights** 2022
- "New Structures in the Outskirts of the Milky Way", co-PI with Yuan-Sen Ting.

**Gemini Observatory, GMOS, 30 hours** 2021-2022
- "A Long-period Cataclysmic Variable in NGC 2234"
- "A New Double-lined White Dwarf Binary from SDSS-V"
- "A Long-Period AM CVn Binary with an Unusual Composition"
- "Monitoring a Dynamic Gaseous Debris Disk around a White Dwarf"
- "A Short-period Double White Dwarf Binary from SDSS-V"
- "Double White Dwarf Binaries from SDSS-V"

**Apache Point Observatory, DIS & ARCTIC, 6 nights)** 2020-2021
- "Monitoring Circumstellar Debris around a Runaway SN Ia Donor"
- "Peculiar Hypervelocity Stars from Gaia EDR3"
- "Time-resolved RVs of Massive WDs in Close Binary Systems"

**Neils Gehrels Swift Observatory, UVOT, 1 hour** 2021
- "ToO: A 99-minute WD+WD Binary", Co-PI with Gagik Tovmassian.

### Co-Investigator (9): (advisees are indicated with an asterisk)

**James Webb Space Telescope, NIRCAM, 48 hours** 2023
- "A Pristine IMF Probe of the Star-Forming Conditions in the Early Universe", PI: Mario Gennaro
- "Does the Stellar Initial Mass Function Depend on Metallicity?", PI: Roger Cohen

**Gemini Observatory, GMOS, 7 hours** 2023
- "The Fastest Stars in the Galaxy", PI: Kareem El-Badry
- "Discovery of a rare massive double-lined WD binary", PI: Gautham Pallathadka*
- "Probing the Mass-Radius Relation of White Dwarfs With Wide Binaries", PI: Stefan Arseneau*

**Magellan Observatory, MagE, 7 nights** 2022
- "Bringing the Gaia Revolution to the Brink of our Galaxy", PI: Rohan Naidu
- "The progenitors of extremely low-mass white dwarfs", PI: Kareem El-Badry

**Apache Point Observatory, DIS, 3 nights** 2022
- "Astrophysics of Stellar Binaries", PI: Nadia Zakamska
- "Following up Double White Dwarf Binaries found in SDSS-V", PI: Nadia Zakamska

## Research Mentorship

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| **Gautham Pallathadka** (JHU PhD, WD binaries in SDSS-V) | 2022-Present |
| **Stefan Arseneau** (JHU UG, gravitational redshift of binary WDs) | 2022-Present |
| **Antonella Macoretta** (JHU UG, statistical gravitational redshift of WDs) | Summer, 2022 |
| **John Magardino** (JHU UG, rotation in magnetic WDs) | Summer, 2020 |
| **Felix Yu** (JHU UG, automated classification of WDs) | Summer, 2020 |

## Teaching

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| **Teaching Fellow, ASTRON 120: Stellar Physics, Harvard** | Spring, 2023 |
| **Teaching Assistant, 360.133: Great Books at Hopkins, JHU** | Fall, 2018 |
| **Teaching Assistant, 171.101: General Physics I, JHU** | Summer, 2018 |

## Professional Service

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| **Referee, Monthly Notices of the Royal Astronomical Society** | 2022-Present |
| **Representative, Harvard Astronomy Student-Faculty Council** | 2021-Present |
| **Member, Sloan Digital Sky Survey V** | 2020-Present |

## Outreach

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| **Executive Committee, CfA Social & Recreational Club** | 2021-Present |
| **Head of Logistics, JHU MedHacks Hackathon** | 2018-2019 |
| **Volunteer, JHU Physics Spring Fair** | 2018-2019 |
| **Contributing Writer, space.stackexchange.com** | 2014-2018 |

## References

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|---|---|
| **Charlie Conroy, Professor, Harvard University** | PhD Advisor, cconroy@cfa.harvard.edu |
| **Hans-Walter Rix, Director, Max Planck Institute for Astronomy** | Advisor, rix@mpia.de |
| **Nadia L. Zakamska, Professor, Johns Hopkins University** | Advisor, zakamska@jhu.edu |
| **Daniel J. Eisenstein, Professor, Harvard University** | TAC Chair, deisenstein@cfa.harvard.edu |
| **Charles R. Alcock, Professor, Harvard University** | Teaching Reference, calcock@cfa.harvard.edu |

18 refereed publications, 7 first-author. *h*-index: 9.

## First-Author Publications

7. **Vedant Chandra**, Rohan Naidu, Charlie Conroy, Alexander P. Ji, Hans-Walter Rix, Ana Bonaca, Phillip A. Cargile, Jiwon Jesse Han, Benjamin D. Johnson, Yuan-Sen Ting, Turner Woody, Dennis Zaritsky (2023)
"Distant Echoes of the Milky Way's Last Major Merger"
*The Astrophysical Journal, in press*

6. **Vedant Chandra**, Charlie Conroy, Nelson Caldwell, Ana Bonaca, Rohan P. Naidu, Dennis Zaritsky, Phillip A. Cargile, Jiwon Jesse Han, Benjamin D. Johnson, Joshua S. Speagle, Yuan-Sen Ting & Turner Woody (2022)
"A Ghost in Boötes: The Least Luminous Disrupted Dwarf Galaxy"
*The Astrophysical Journal, 940, 127*

5. **Vedant Chandra**, Hsiang-Chih Hwang, Nadia L. Zakamska, Simon Blouin, Andrew Swan, Thomas R. Marsh, Ken J. Shen, Boris T. Gänsicke, J.J. Hermes, Odelia Putterman, Evan B. Bauer, Evan Petrosky, Vikram S. Dhillon, Stuart P. Littlefair & Richard P. Ashley (2022)
"The SN Ia Runaway LP 398-9: Detection of Circumstellar Material and Surface Rotation"
*Monthly Notices of the Royal Astronomical Society, 512, 6122*

4. **Vedant Chandra**, Hsiang-Chih Hwang, Nadia L. Zakamska, Boris T. Gänsicke, J.J. Hermes, Axel Schwope, Carles Badenes, Gagik Tovmassian, Evan B. Bauer, Dan Maoz, Matthias R. Schreiber, Odette F. Toloza, Keith P. Inight, Hans-Walter Rix & Warren R. Brown (2021)
"A 99-minute Double-lined White Dwarf Binary from SDSS-V"
*The Astrophysical Journal, 921, 160*

3. **Vedant Chandra** & Kevin C. Schlaufman (2021)
"Searching for Low-mass Population III Stars Disguised as White Dwarfs"
*The Astronomical Journal, 161, 197*

2. **Vedant Chandra**, Hsiang-Chih Hwang, Nadia L. Zakamska & Sihao Cheng (2020)
"A Gravitational Redshift Measurement of the White Dwarf Mass–Radius Relation"
*The Astrophysical Journal, 899, 146*

1. **Vedant Chandra**, Hsiang-Chih Hwang, Nadia L. Zakamska & Tamás Budavári (2020)
"Computational Tools for the Spectroscopic Analysis of White Dwarfs"
*Monthly Notices of the Royal Astronomical Society, 497, 2688*

## Publications with Major Contributions

3. René Andrae, Hans-Walter Rix, **Vedant Chandra** (2023)
"Robust Data-driven Metallicities for 175 Million Stars from Gaia XP Spectra"
*The Astrophysical Journal Supplement, in press*

2. Hans-Walter Rix, **Vedant Chandra**, René Andrae, Adrian M. Price-Whelan, David H. Weinberg, Charlie Conroy, Morgan Fouesneau, David W Hogg, Francesca De Angeli, Rohan P. Naidu, Maosheng Xiang & Daniela Ruz-Mieres (2022)
"The Poor Old Heart of the Milky Way"
*The Astrophysical Journal, 941, 45*

1. Evan B. Bauer, **Vedant Chandra**, Ken J. Shen & J.J. Hermes (2022)
"Masses of White Dwarf Binary Companions to Type Ia Supernovae Measured from Runaway Velocities"
*The Astrophysical Journal Letters, 923, L24*

## Co-Authored Publications

8. The SDSS-V Collaboration (incl. **Vedant Chandra**) (2023)
"The Eighteenth Data Release of the Sloan Digital Sky Surveys: Targeting and First Spectra from SDSS-V"
*The Astronomical Journal, submitted*

7. Jiwon Jesse Han, Charlie Conroy, Benjamin D. Johnson, Joshua S. Speagle, Ana Bonaca, **Vedant Chandra**, Rohan P. Naidu, Yuan-Sen Ting, Turner Woody & Dennis Zaritsky (2022)
"The Stellar Halo of the Galaxy is Tilted & Doubly Broken"
*The Astronomical Journal, 164, 249*

6. Rohan P. Naidu, Charlie Conroy, Ana Bonaca, Dennis Zaritsky, Yuan-Sen Ting, Nelson Caldwell, Phillip A. Cargile, Joshua S. Speagle, **Vedant Chandra**, Benjamin D. Johnson, Turner Woody, and Jiwon Jesse Han (2022)
"Live Fast, Die $\alpha$-Enhanced: The Mass-Metallicity-$\alpha$ Relation of the Milky Way's Disrupted Dwarf Galaxies"
*The Astrophysical Journal, submitted*

5. Charlie Conroy, David H. Weinberg, Rohan P. Naidu, Tobias Buck, James W. Johnson, Phillip Cargile, Ana Bonaca, Nelson Caldwell, **Vedant Chandra**, Jiwon Jesse Han, Benjamin D. Johnson, Joshua S. Speagle, Yuan-Sen Ting, Turner Woody, and Dennis Zaritsky (2022)
"Birth of the Galactic Disk Revealed by the H3 Survey"
*The Astrophysical Journal, submitted*

4. Rohan P. Naidu, Alexander P. Ji, Charlie Conroy, Ana Bonaca, Yuan-Sen Ting, Dennis Zaritsky, Lieke A. C. van Son, Floor S. Broekgaarden, Sandro Tacchella, **Vedant Chandra**, Nelson Caldwell, Phillip Cargile & Joshua S. Speagle (2022)
"Evidence from Disrupted Halo Dwarfs that r-process Enrichment via Neutron Star Mergers is Delayed by $\gtrsim$ 500 Myrs"
*The Astrophysical Journal Letters, 926, L36*

3. Jiwon Jesse Han, Rohan P. Naidu, Charlie Conroy, Ana Bonaca, Dennis Zaritsky, Nelson Caldwell, Phillip Cargile, Benjamin D. Johnson, **Vedant Chandra**, Joshua S. Speagle, Yuan-Sen Ting & Turner Woody (2022)
"A Tilt in the Dark Matter Halo of the Galaxy"
*The Astrophysical Journal, 934, 14*

2. Hsiang-Chih Hwang, Yuan-Sen Ting, Charlie Conroy, Nadia L. Zakamska, Kareem El-Badry, Phillip Cargile, Dennis Zaritsky, **Vedant Chandra**, Jiwon Jesse Han, Joshua S. Speagle & Ana Bonaca (2022)
"Wide binaries from the H3 survey: the thick disk and halo have similar wide binary fractions"
*Monthly Notices of the Royal Astronomical Society, 513, 754*

1. Evan Petrosky, Hsiang-Chih Hwang, Nadia L. Zakamska, **Vedant Chandra** & Matthew Hill (2021)
"Variability, periodicity and contact binaries in WISE"
*Monthly Notices of the Royal Astronomical Society, 503, 3975*

## Other Writing

2. Charlie Conroy, Dan Fabricant, Nelson Caldwell, **Vedant Chandra**, Jesse Han, Phill Cargile, Ana Bonaca, Dennis Zaritsky (2022)
"A Fast All-Sky Spectroscopic Survey to Discover the Nature of Dark Matter, Find the Edge of Galaxy Formation, and Map the Cold Gas Feeding the Milky Way"
*CfA Science & Technology White Paper*

1. **Vedant Chandra** (2020)
"Measuring the White Dwarf Mass-Radius Relation using Thousands of Stars"
*astrobites*