VEDANT CHANDRA

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Professional Appointments

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

Talks and Presentations

Supernova Explosions (SNEx) Meeting, University of Massachusetts (forthcoming) October, 2023
- "Hypervelocity Runaways from Type Ia Supernovae".

Central Halo Workshop, University of Cambridge September, 2023
- "Chemodynamically Surveying the Ancient Heart of the Milky Way".

ITC Luncheon, CfA | Harvard & Smithsonian September, 2023
- "Discovery of the Magellanic Stellar Stream Out to 100 kpc", video.

SDSS-V Collaboration Meeting August, 2023
- "Mapping the Milky Way's Outer Halo with SDSS-V".

Galaxy Coffee, MPIA July, 2023

- "Discovery of the Magellanic Stellar Stream Out to 100 kpc".

Gaia XPloration Workshop, University of Cambridge May, 2023

- "Mapping the Outer Halo of the Milky Way with XP".

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, CfA | Harvard & Smithsonian 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

Milky Way Surveys Conference, Caltech (forthcoming) October, 2023

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

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

New Scientist July, 2023

- "Stars found hidden in huge cloud wrapped around the Milky Way"

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"

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 (15):

MPG/ESO 2.2m, FEROS, 110 hours 2023
- "The Enrichment History of the Ancient Milky Way", co-PI with Hans-Walter Rix.

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

Magellan Observatory, MagE, 14 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 (11): (advisees are indicated with an asterisk)

ESO Very Large Telescope, X-Shooter, 8 hours 2023
- "The Fastest Stars in the Galaxy", PI: Kareem El-Badry.

CTIO Blanco, DECam, 54 nights 2023
- "The DECam MAGIC Survey: Mapping the Ancient Galaxy in CaHK", PI: Anirudh Chiti.

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

Nicole Crumpler (JHU PhD, WD EoS with SDSS-V) 2022-Present

Gautham A. Pallathadka (JHU PhD, WD binaries in SDSS-V) 2022-Present

Stefan Arseneau (JHU UG, gravitational redshift of binary WDs) 2022-Present

Teaching

Teaching Fellow, ASTRON 202a: Galaxies and Cosmology, Harvard (forthcoming) Spring, 2024

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

Member, DELVE-MAGIC Survey 2023-Present

Lead Organizer, Harvard Astronomy Student-Faculty Forum 2023-Present

Instrumentation & Survey Team, the Via Project 2022-Present

Journal Referee (MNRAS, ApJS) 2022-Present

Member, Sloan Digital Sky Survey V 2020-Present

Representative, Harvard Astronomy Student-Faculty Council 2021-2023

Outreach

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

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

25 refereed publications, 8 as lead-author. *h*-index: 11. Advisees are highlighted with an asterisk.

Lead-Author Publications

8. **Vedant Chandra**, Rohan P. Naidu, Charlie Conroy, Ana Bonaca, Dennis Zaritsky, Phillip A. Cargile, Nelson Caldwell, Benjamin D. Johnson, Jiwon Jesse Han, and Yuan-Sen Ting (2023)
"Discovery of the Magellanic Stellar Stream Out to 100 Kiloparsecs"
The Astrophysical Journal, in press

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, 951, 26

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

5. Vadim A. Semenov, Charlie Conroy, **Vedant Chandra**, Lars Hernquist, and Dylan Nelson (2023)
"Formation of Galactic Disks I: Why did the Milky Way's Disk Form Unusually Early?"
The Astrophysical Journal, submitted

4. Kareem El-Badry, Ken J. Shen, **Vedant Chandra**, Evan Bauer, Jim Fuller, Jay Strader, Laura Chomiuk, Rohan Naidu, Ilaria Caiazzo, Antonio C. Rodriguez, Pranav Nagarajan, Natsuko Yamaguchi, Zachary P. Vanderbosch, Benjamin R. Roulston, Jan van Roestel, Boris Gänsicke, Jiwon Jesse Han, Kevin B. Burdge, Alexei V. Filippenko, Thomas G. Brink, and WeiKang Zheng (2023)
"The fastest stars in the Galaxy"
The Open Journal of Astrophysics, 6 (July)

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, 267, 8

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

12. Jiadong Li, Kaze W.K. Wong, David W. Hogg, et al (2023)
"AspGap: Augmented Stellar Parameters and Abundances for 23 million RGB stars from Gaia XP low-resolution spectra"
The Astrophysical Journal Supplement, submitted

11. Guilherme Limberg, Alexander P. Ji, Rohan P. Naidu, et al (2023)
"Extending the Chemical Reach of the H3 Survey: Detailed Abundances of the Dwarf-galaxy Stellar Stream Wukong/LMS-1"
Monthly Notices of the Royal Astronomical Society, submitted

10. Vadim A. Semenov, Charlie Conroy, **Vedant Chandra**, et al (2023)
"Formation of Galactic Disks II: the Physical Drivers of Disk Spin-up"
The Astrophysical Journal, submitted

9. Keith Inight, Boris T. Gänsicke, Axel Schwope, et al (2023)
"Cataclysmic Variables from Sloan Digital Sky Survey V – the search for period bouncers continues"
Monthly Notices of the Royal Astronomical Society, submitted

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

7. Jiwon Jesse Han, Charlie Conroy, Benjamin D. Johnson, et al (2022)
"The Stellar Halo of the Galaxy is Tilted & Doubly Broken"
The Astronomical Journal, 164, 249

6. Rohan P. Naidu, Charlie Conroy, Ana Bonaca, et al (2022)
"Live Fast, Die α-Enhanced: The Mass-Metallicity-α Relation of the Milky Way's Disrupted Dwarf Galaxies"
The Astrophysical Journal, submitted

5. Charlie Conroy, David H. Weinberg, Rohan P. Naidu, et al (2022)
"Birth of the Galactic Disk Revealed by the H3 Survey"
The Astrophysical Journal, submitted

4. Rohan P. Naidu, Alexander P. Ji, Charlie Conroy, et al (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, et al (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, et al (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, et al (2021)
"Variability, periodicity and contact binaries in WISE"
Monthly Notices of the Royal Astronomical Society, 503, 3975

Other Writing

4. Arjun Dey, Joan Najita, Carrie Fillion, et al (2023)
"RomAndromeda: The Roman Survey of the Andromeda Halo"
NASA Roman Core Community Survey White Paper

3. Jiwon Jesse Han, Arjun Dey, Adrian M. Price-Whelan, et al (2022)
"NANCY: Next-generation All-sky Near-infrared Community surveY"
NASA Roman Core Community Survey White Paper

2. Charlie Conroy, Dan Fabricant, Nelson Caldwell, **Vedant Chandra**, et al (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"
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