C.V DIGVIJAY (JAY) WADEKAR

Contact

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Citizenship: Indian

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Professional Positions

Postdoctoral fellow — September 2021 - current
Institute for Advanced Study (IAS), Princeton, NJ

Education

New York University (NYU) — New York, NY — September 2021
Ph.D. (alongside MS & M.Phil in Astrophysics) — GPA: 3.89/4.0

Indian Institute of Technology, Bombay (IITB)—Mumbai, India — May 2015
B.Tech (Bachelor of Technology) in Engineering Physics with Honors in Physics

Research Interests

- Dark matter phenomenology with dwarf galaxies
- Cosmology with Sunyaev-Zeldovich (SZ) and galaxy spectroscopic surveys
- Interpretable machine learning and cosmological hydrodynamic simulations
- Gravitational wave astrophysics

Invited talks & colloquia

Astrophysics seminar, IAS, Princeton	February 2022
Astrophysics seminar, IIT Hyderabad, India [slides]	February 2022
Astrophysics seminar, TIFR, India	January 2022
SOTU seminar, TIFR, India	November 2021
RPM seminar, Lawrence Berkeley National Lab, CA [slides]	January 2021
CCA lunch talk, Center for computational astrophysics, NY	August 2020
Princeton/IAS Cosmology lunch talk , Princeton, NJ	December 2019
Cosmology seminar, TIFR, Mumbai, India	December 2019
Cosmology seminar, UC Berkeley, CA [slides]	October 2019
Workshop on dynamics of LSS formation, MIAPP, Garching, Germany	July 2019

Awards & Honors

- **Postdoctoral fellowship**, IAS (2021 - current)
- **Subrahmanyan Chandrasekhar postdoctoral fellowship**, Perimeter Insitute (declined)
- **James Arthur Dissertation Fellowship**, NYU (2020 - 2021)
- **James Arthur Graduate Fellowship**, NYU (2019 - 2020)
- **Henry Mitchell McCracken Fellowship** at NYU (2015 - 2019)
- **All India Rank 139** in IIT-JEE 2011 exam (**99.97 percentile**) among 485,000 candidates.
- **KVPY fellowship** (Kishore Vaigynaik Protsahan Yojana) by the Govt. of India (declined)
- **NTSE fellowship** (National Talent Search Scholarship) by the Govt. of India.
- **Travel grants:** DAP travel award (600$) & DGRAV travel award (300$) for APS April Meething 2019. DAP travel award (600$) for APS April Meeting 2018

Service

- Referee for MNRAS
- Author of the CovaPT code for calculating analytic covariance matrices for upcoming galaxy spectroscopic surveys.

Collaborations

Member of the Dark Energy Spectroscopic Instrument (DESI) — 2019-current

Publications

The most-updated list and metrics are available at ADS.
I have published 15 refereed papers, 190+ citations, h-index 8
11 of them are first/second author papers, 140+ citations, h-index 6 (library)

(Primary /secondary author)

11. Percent-level constraints on baryonic feedback with spectral distortion measurements arXiv:2201.01663
*L.Thiele, **D. Wadekar**, J. C. Hill, N. Battaglia, J. Chluba, et al.*
10. Augmenting astrophysical scaling relations with machine learning: application to reducing the SZ flux-mass scatter — arXiv:2201.01305
***D. Wadekar**, L.Thiele, F. Villaescusa-Navarro, J. C. Hill, D. Spergel, et al.*

9. Strong constraints on decay and annihilation of dark matter from heating of gas-rich dwarf galaxies — arXiv:2111.08025
D. Wadekar, *Z. Wang*

8. Modeling the galaxy-halo connection with machine learning — arXiv:2111.02422
A. Delgado, ***D. Wadekar****, B. Hadzhiyska, S. Bose, L. Hernquist, S. Ho*

7. Modeling the neutral hydrogen assembly bias with machine learning and symbolic regression — arXiv:2012.00111
D. Wadekar, *F. Villaescusa-Navarro, S. Ho, L. Perreault-Levasseur*

6. Cosmological constraints from BOSS with analytic covariance matrices — arXiv:2009.00622, PRD 2020
D. Wadekar, *M. Ivanov, R. Scoccimarro*

5. HInet: Generating neutral hydrogen from dark matter with neural networks — arXiv:2007.10340, ApJ 2021
D. Wadekar, *F. Villaescusa-Navarro, S. Ho, L. Perreault-Levasseur*

4. Gas-rich dwarf galaxies as a new probe of dark matter interactions with ordinary matter — arXiv:1903.12190, PRD 2021
D. Wadekar, *G. Farrar*

3. The Galaxy Power Spectrum Multipoles Covariance in Perturbation Theory — arXiv:1910.02914, PRD 2020
D. Wadekar, *R. Scoccimarro* [Editors' suggestion]

2. Comment on "Calorimetric Dark Matter Detection with Galactic Center Gas Clouds" — PRL 2020
G. Farrar , F. Lockman, N. McClure-Griffiths, ***D. Wadekar****** [arXiv:1903.12191]

1. Zeldovich pancakes at redshift zero: the equilibration state and phase space properties. — MNRAS 2015
D. Wadekar, *S. Hansen* [arXiv:1411.6627]

(Co-author)

4. The CAMELS project: public data release — arXiv:2201.01300
F. Villaescusa-Navarro et al. (incl. ***D. Wadekar****)*

3. The CAMELS Multifield Dataset: Learning the Universe's Fundamental Parameters with Artificial Intelligence — arXiv:2109.10915
F. Villaescusa-Navarro et al. (incl. ***D. Wadekar****)*

2. The CAMELS project: Cosmology and Astrophysics with Machine Learning Simulations — arXiv:2010.00619, ApJ 2021
F. Villaescusa-Navarro et al. (incl. ***D. Wadekar****)*

1. Variance Adaptation in Navigational Decision Making — eLife 2018
R. Gepner, J. Wolk, ***D. Wadekar****, S. Dvali, M. Gershow*

* indicates alphabetical authorship

Mentoring

- Zihui Wang: NYU graduate student. *Co-authored a paper.*
- Ana Maria Delgado: Harvard graduate student. *Co-authored a paper.*
- Leander Thiele: Princeton graduate student. *Co-authored two papers.*

Outreach

- *Outreach talks*:
Before the pandemic started, I used to give $\sim$ 5 talks each year to high schools students in my hometown in India about the current cutting-edge research in science and ways of pursuing research as a career option. Here is an example
- *Academic Mentorship*:
Tutored academically weak students at IIT Bombay in complex analysis and differential equations. Mentored two students in the physics department and helped them in clearing their backlogs.
- *Astronomy Club*:
Gave talks on future of astronomy at IIT Bombay to a general audience. I also headed a project in collaboration with the club to build a Solar Radio Telescope from scratch.
- Completed science communication writing workshops at the NYU journalism institute and published a review on an upcoming popular science book [link].

Teaching Experience

- Teaching Assistant(TA) at NYU for Mathematical Physics (undergraduate) — Spring 2018
- TA at NYU for Electricity & Magnetism- I (undergraduate) — Fall 2016
- TA at IITB for Electromagnetism- I (undergraduate) — Spring 2015

Technical Skills

- Programming: C/C++, Python, Mathematica, FORTRAN77
- Operating Systems: Linux, Windows, Mac
- Analysis Tools: Pytorch, scikit-learn

References

Prof. Roman Scoccimarro (PhD advisor) — rs123@nyu.edu
Prof. Glennys Farrar — gf25@nyu.edu
Prof. Colin Hill — jch2200@columbia.edu
Prof. David Spergel — dspergel@flatironinstitute.org
Prof. Shirley Ho — shirleyho@flatironinstitute.org