C.V DIGVIJAY (JAY) WADEKAR

Contact

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Professional Positions

Member (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)

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

Research Interests

- Detection of gravitational wave candidates with LIGO/Virgo/KAGRA data
- Application of interpretable machine learning techniques to astrophysics
- Dark matter phenomenology from observations of dwarf galaxies
- Cosmology with Sunyaev-Zeldovich (SZ) and galaxy spectroscopic surveys

Invited talks & colloquia

Astro coffee, Princeton University	September 2022
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)
  - awarded to one student across all science, humanities, social science programs at NYU.
- **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

Mentoring

- Zihui Wang: NYU graduate student. *Co-authored two papers.*
- Ana Maria Delgado: Harvard graduate student. *Co-authored a paper.*
- Leander Thiele: Princeton graduate student. *Co-authored three papers.*
- Param Gogia: Vassar college undergraduate student

Service

- Referee for MNRAS, Phys. Rev. D, Annalen der Physik.
- Organizer for the IAS astrophysics seminars
- Organizer for the dark cosmos seminar series (Princeton University)
- Author of the public CovaPT code for calculating analytic covariance matrices for upcoming galaxy spectroscopic surveys.

Collaborations

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

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

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].

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. Matias Zaldarriaga matiasz@ias.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

Publications

The most-updated list and metrics are available at ADS.
I have published 20 papers, 484+ citations, h-index 11
13 of them are first/second author papers, 300+ citations, h-index 9 (library)

(Primary /secondary author)

13. Constraining axion and compact dark matter with interstellar medium heating arXiv:2211.07668
D. Wadekar, Z. Wang* PRD 2023

12. The SZ flux-mass ($Y - M$) relation at low halo masses: arXiv:2209.02075
improvements with symbolic regression MNRAS 2023
and strong constraints on baryonic feedback
***D. Wadekar**, L.Thiele, F. Villaescusa-Navarro, J. C. Hill, D. Spergel, et al.*

11. Percent-level constraints on baryonic feedback with CMB spectral distortions arXiv:2201.01663
*L.Thiele, **D. Wadekar**, J. C. Hill, N. Battaglia, J. Chluba, et al.* PRD 2022

10. Augmenting astrophysical scaling relations with machine learning: arXiv:2201.01305
application to reducing the SZ flux-mass scatter PNAS 2023
***D. Wadekar**, L.Thiele, F. Villaescusa-Navarro, J. C. Hill, D. Spergel, et al.*

9. Strong constraints on decay and annihilation of dark matter arXiv:2111.08025
from heating of gas-rich dwarf galaxies PRD 2022
***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* MNRAS 2022

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

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

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

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]

* indicates alphabetical authorship

(Co-author)

5. In Pursuit of Love: First Templated Search for Compact Objects with Large Tidal Deformabilities in the LIGO-Virgo Data — arXiv:2306.00050, PRD submitted
   H. S. Chia, T. Edwards, ***D. Wadekar*** *et al.*

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, ApJ 2022
   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*

Recent contributed talks

L2G2 meeting, Columbia University	March 2023
Princeton/IAS cosmology meeting, Princeton University	October 2021
Brown bag talk, NYU	March 2021
Particle and Astrophysics meeting, CCA	December 2020
Cosmology group meeting, University of Chicago	December 2020
Astrophysics seminar, University of Pennsylvania	December 2020
Cosmology seminar, Caltech/JPL	November 2020
Cosmology group meeting, CITA	November 2020
Cosmology seminar, Perimeter	November 2020
Dvorkin group meeting, Harvard	November 2020
Eisenstein group meeting, Harvard	October 2020
Hernquist group meeting, Harvard	October 2020
Lunch talk, MIT	October 2020
Cosmology at home conference [video]	August 2020
Euclid survey ML meeting, Zoom	July 2020
BCCP workshop: Spectroscopic surveys, UC Berkeley, CA	January 2020
April Meeting of the American Physical Society(APS), Denver, CO	April 2019
April Meeting of the American Physical Society(APS), Columbus, OH	April 2018