Curriculum Vitae — DIGVIJAY (JAY) WADEKAR

Contact

jay.wadekar@nyu.edu — Website

Education

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

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

Submitted Manuscripts

First direct astrophysical constraints on dark matter interactions with ordinary matter at very low velocities
D. Wadekar, *G. Farrar* [arXiv:1903.12190] — Submitted to PRL

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

Peer Reviewed Journal Publications

Zeldovich pancakes at redshift zero: the equilibration state and phase space properties.
D. Wadekar, *S. Hansen* (arXiv:1411.6627) — MNRAS 447,1337 (2015)

Variance Adaptation in Navigational Decision Making
R. Gepner, J. Wolk, ***D. Wadekar***, *S. Dvali, M. Gershow* — eLife (2018); 7:e37945

Manuscripts in preparation

Analytic covariance of the redshift-space galaxy power spectrum
D. Wadekar, *R. Scoccimarro* (arXiv:1909.xxxx)

Talks

Fully analytic model for galaxy power spectrum covariance **(invited)** — July 2019
Workshop on dynamics of LSS formation
Munich institute of Astro and Particle Physics (MIAPP), Garching, Germany

First direct astrophysical constraints on DM interactions at very low velocities (contributed)
April Meeting of the American Physical Society(APS), Denver, CO — April 2019
DAP travel award (600$) & DGRAV travel award (300$)

Astrophysical implications of Dark Matter interacting with Baryons (contributed) — April 2018
April Meeting of the American Physical Society(APS), Columbus, OH
DAP travel award (600$)

Simulations of Interacting Dark Matter (contributed) — March 2017
Pheno & Vino seminar presentation, NYU

Analytic covariance for galaxy power spectrum (contributed) — October 2019
NYU, AMNH & CUNY Astrofest, NYU

Posters

Max Planck Institute for Astrophysics, Berlin, Germany — July 2018

NYU, AMNH & CUNY Astrofest, NYU — October 2018

Awards & Honors

- **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 Examination) by the Govt. of India.
- Scored **990/990** in the subject GRE in Physics.
- Among **top 30** students selected from all over India to attend Orientation cum Selection Camp (OCSC) for International Olympiad on Astronomy and Astrophysics (IOAA) and International Junior Science Olympaid (IJSO), after clearing two nationwide examinations participated in by more than 15000 students.

Selected Projects

Analytic covariance of the redshift-space galaxy power spectrum & bispectrum
Guide : Prof. Roman Scoccimarro, NYU *Spring 2016- Current*
We provide a new robust analytic method to compute the covariance matrix of galaxy redshift-space power spectrum. Our method is five orders of magnitude faster than traditional techniques which require simulating a large number of expensive mock simulations. We are now trying to generalize our technique to calculate covariance of redshift-space bispectrum, which is computationally prohibitive using mock simulations.

Constraints on interactions of Dark Matter with ordinary matter using astrophysical systems
Guide : Prof. Glennys Farrar, NYU *Summer 2016- Current*
We require that the heating/cooling due to DM interacting with gas in the Leo T dwarf galaxy cannot exceed the radiative cooling rate of the gas. We thus derive strong limits on the charge of DM and on kinematic mixing strength of dark photons.

Behavioral adaptation to variance in sensory input
Guide : Prof. Marc Gershow, NYU *Fall 2016*
We build a model of how the sensory information is processed by neurons and transformed into motor activity. We performed behavioral experiments on larval Drosophila to see how neural responses adapt to temporal changes in the variance of sensory input.

Equilibration of Zeldovich Pancakes & Analysis of 1D Eddington Model
Guide : Prof. Steen Hansen, Dark Cosmology Center, Uni. of Copenhagen *Spring 2014*
We worked on methods to differentiate the Zeldovich pancakes (sheets), which are collapsed along one dimension, from other structures in the cosmic web. We used the sheet's phase space profile to determine its level of equilibrium.

Teaching Experience

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

Technical Skills

- *Programming:* C/C++, Python, Mathematica, FORTRAN77
- *Operating Systems:* Linux, Windows, Mac
- Working knowledge of Pytorch, scikit-learn

Mentorship and Outreach

- *Academic Mentorship*: *Fall 2014*
  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*: *2011-12*
  Gave talks on future of astronomy at IIT Bombay which were open to the general public. I also headed a project in collaboration with the club to build a Solar Radio Telescope from scratch.

References

- *Prof. Roman Scoccimarro* (PhD Thesis advisor) rs123@nyu.edu
- *Prof. Glennys Farrar* (Project advisor) gf25@nyu.edu
- *Prof. Steen H. Hansen* (Project advisor) hansen@dark-cosmology.dk