Curriculum Vitae — DIGVIJAY(JAY) WADEKAR

Contact Information

1022 Broadway, Apt 3,
Brooklyn, New York, USA, 11221.

mobile: +1-9293855788
digvijay.wadekar@gmail.com

Education

MS, PhD in Physics
Department of Physics, New York University(NYU) *August 2020 (Expected)*

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

Publications

Zeldovich pancakes at redshift zero: the equilibration state and phase space properties.
Digvijay Wadekar & Steen H. Hansen (arXiv:1411.6627)
Monthly Notices of the Royal Astronomical Society 2014 447 (4): 1337-1344 [Link]

Behavioral adaptation to variance in sensory input
Marc Gershow, Ruben Gepner, Jason Wolk & Digvijay Wadekar
Computational and Systems Neuroscience (Cosyne) conference, 2017, I-106
Also selected for presentation at APS March Meeting 2017, abstract id: R5.014

Talks & Presentations

Simulations of Interacting Dark Matter *March 2017*
Pheno & Vino seminar presentation

Behavioral adaptation to variance in sensory input *March 2017*
Experimental research talk, NYU

Awards & Honors

- **All India Rank 139** in IIT-JEE 2011 exam with 99.97 percentile among 0.5 million students.
- **KVPY**(Kishore Vaigynaik Protsahan Yojana) fellowship by the Govt. of India which is awarded competitively based on a comprehensive examination and a technical interview, to promising students of the physical sciences.
- **NTSE**(National Talent Search Examination) fellowship by the Govt. of India.
- 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.
- Secured certificate of merit for being in the national **top 1%** in National standard examination in Physics (NSEP), organized by HBCSE.
- Scored **990/990** in the subject GRE in Physics

Research Experience

Simulations of dark matter interacting with gas in the Milky Way
Guide : Prof. Glennys Farrar *Summer 2016- Current*
New York University
We test a model for dark matter (DM) which includes elastic interactions with baryons. Performing simple simulations of galaxies with a halo composed of interacting DM particles, we study the implications of such interactions for the spatial and velocity distribution of the DM in our Galaxy. Simulations show that the local DM comes into quasi-co-rotation with the gas disk, potentially explaining correlated structure observed in gas and DM in rotation curves. DM-baryon collisions also heat the gas in galaxies and galaxy clusters, which can address long-standing astrophysical problems like star-formation quenching observed in galaxies and hot gas components observed in centers of galaxy clusters.

Analytic Computation of Matter Power Spectrum Covariance
Guide : Prof. Roman Scoccimarro *Fall 2015- Current*
New York University
We provide a new robust analytic method to compute the covariance of matter power spectrum. This technique is computationally much cheaper than the widely used technique which requires simulating a large number of mocks.

Behavioral adaptation to variance in sensory input
Guide : Prof. Marc Gershow *Fall 2016*
New York University
A rich field of study has examined how neural responses adapt to temporal changes in the variance of sensory input, but the behavioral correlates of this adaptation have received comparatively little attention. We used the navigational decisions of larval Drosophila to quantify the dynamics of adaptation to variance in a model sensory-motor transformation.

Summer Internship: Equilibration of Zeldovich Pancakes & Analysis of 1D Eddington Model
Guide : Prof. Steen Hansen *Summer 2013- Spring 2014*
Dark Cosmology Center, Neils Bohr Institute, University of Copenhagen
I worked on methods to differentiate the Zeldovich-Pancakes(sheets), which are collapsed along one dimension, from other structures in the cosmic web which have equilibrated along more dimensions. I used the sheet's phase space profile to determine its level of equilibration, and studied its density and velocity distributions. I have also generalized the *Eddington method*, which was originally used for three dimensional structures, to be applicable now for structures equilibrated along one dimension. I used this method on directly observed sheets and compared the calculated distribution functions with observed profiles.

Summer Internship: Effects of Light WIMPs in Big Bang Nucleosynthesis
Guide: Dr. Signe Riemer Sørensen *Summer 2014*
Institute for Theoretical Astrophysics, University of Oslo
I studied the effects of adding *light* WIMPs on the big bang nuclosynthesis primordial abundances. I modified the *Alterbbn* Nucleosynthesis code to incorporate the energy and pressure densities of either electromagnetically coupled or neutrino coupled light WIMPs with `arXiv:1312.5725` as reference.

Senior Thesis: Constraints on comsmological parameters by galaxy surveys
Guides: Prof. Subhabrata Majumdar & Prof. Raghava Varma *July 2014- Summer 2015*
Department of Theoretical Physics, TIFR; Department of Physics, IITB
I am working on constraining cosmological paramters using galaxy cluster properties. I am trying to build three likelihood modules using- galaxy number density variation, cluster gas fraction (f_{gas}) & cluster power spectrum.

Conferences & Workshops

Rapid Response Workshop: Binary NS Merger
Center for Theoretical Physics, Columbia University *October 2017*

Scientific Visualization Conference
Center for Computational Astrophysics, Flatiron Institute *October 2017*

Rethinking Cosmology
Princeton Center for Theoretical Science, Princeton *May 2016*

Gravitational Wave Astronomy summer school
International Center for Theoretical Sciences (ICTS), India *August 2015*

International Workshop on Astroparticle Physics(WAPP)
Center for Astroparticle Physics, Bose Institute, India *Winter 2013*

National Initiative for Undergraduate Students(NIUS)
Homi Bhabha Center for Science Education, India *Summer 2012*

Orientation Cum Selection Camp(OCSC) -International Olympiads
Homi Bhabha Center for Science Education, India *May 2011 & 2009*

Teaching Experience

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

- **Operating Systems:** Linux (Ubuntu), Windows, Mac

Miscellaneous

Languages :
English (Fluent), Hindi (Fluent), Marathi (fluent), French (basic knowledge)

References

- **Prof. Roman Scoccimarro** (Project advisor) rs123@nyu.edu
- **Prof. Glennys Farrar** (Project advisor) gf25@nyu.edu
- **Prof. Steen H. Hansen** (Project advisor) hansen@dark-cosmology.dk
- **Prof. Raghava Varma** (Senior Thesis & Junior Thesis Guide) varma@phy.iitb.ac.in
- **Prof. Subhabrata Majumdar** (Senior Thesis Guide) subha@tifr.res.in