JEIMIN A GARIBNAVAJWALA

M.S. Student • Department of Physics • Drexel University

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EDUCATION

DREXEL UNIVERSITY | PHILADELPHIA, PA

M.S. in Physics — *Expected: Jun 2024*

BOSTON UNIVERSITY | BOSTON, MA

B.A. in Astronomy and Physics — *May 2021*

RESEARCH INTERESTS

Theoretical astrophysics and cosmology, general relativity, gravitational lensing, dark matter, dark energy, formation and evolution of galaxies, formation and evolution of large-scale structures.

RESEARCH EXPERIENCE

WEAK GRAVITATIONAL LENSING |DREXEL UNIVERSITY — *Nov 2022 – present*

Research Advisor: Dr. David Goldberg

Developed a three-stage pipeline in Python to harness flexion, higher-order weak gravitational lensing signal, for mapping substructures within a designated galaxy cluster. The initial stage involved processing James Webb Space Telescope's (JWST) Level-2 imaging data thereby generating cutouts of individual galaxies. In the subsequent phase, I employed a specialized software, LENSER, developed by a peer, to measure weak lensing signals on each galaxy. The final stage utilized the measured flexion signals and an inverse Fourier transform method, pioneered by Kaiser and Squires, to derive a surface mass density map. This map served as a basis for estimating the mass of the cluster. The pipeline's application to the observational data for SMACSJ0723 produced results consistent with previous studies. This encouraged us to employ and further test this pipeline by studying the mass distribution in El Gordo cluster which is at a redshift of 0.87.

Alongside, the trajectory of this project is evolving towards leveraging multi-band data for accurate mapping of substructures. The aim is to statistically minimize the contamination of flexion signals due to morphologies of galaxies as observed in various bands.

GALAXY LUMINOSITY FUNCTIONS |BOSTON UNIVERSITY — *Nov 2020 – Sept 2022*

Research Advisor: Dr. Tereasa Brainerd

The focus of this project was to advance the understanding of galaxy properties by investigating Luminosity Functions (LF) of galaxies within their clusters. My computational objectives were twofold: first, to utilize a catalog of RedMaPPer galaxies and calculate the LFs associated with their absolute magnitudes in red band; second, to replicate this process using absolute magnitudes measured through 3.5-micron band. To achieve this, I developed a Python code for cross-matching the RedMaPPer catalog with the unWISE catalog, which encompasses approximately 2 billion objects. This cross-matching facilitated the extraction of the necessary 3.5-micron absolute magnitudes, subsequently enabling the computation of the LFs within the chosen wavelength range.

TEACHING EXPERIENCE

TEACHING ASSISTANT | DREXEL UNIVERSITY

PHYS 101 | RECITATION | FUNDAMENTALS OF PHYSICS I *Spring 2023*

I contributed to the first segment of a comprehensive three-course physics sequence designed for engineering and science majors. The course delves into the fundamental principles of mechanics, exploring topics such as translational and rotational kinematics in one and two dimensions, inertial and non-inertial frames, Newton's laws of motion, force, energy, and momentum. I actively engaged in presenting problem-solving techniques to enhance students' proficiency in applying theoretical concepts.

PHYS 170 | RECITATION | ELECTRICITY AND MOTION *Fall 2022*

The course provided students with a conceptual introduction to fundamental physics topics such as Newton's laws of motions, force, energy, electricity, and magnetism. I facilitated a student-centered approach, encouraging engagement and collaborative problem-solving environment. Through this hands-on and interactive approach, I contributed to creating a dynamic learning environment that bridged theoretical concept with real-world applications.

PHYS 171 | COMPUTATIONAL LAB | ELECTRICITY AND MOTION *Fall 2022, 2023*

Within the context of "Computational Lab," I actively engaged students in studying simulations that revolved around the fundamental laws of physics such as linear motion, Newton's laws, energy conservation, Coulomb's law for electric charges, and current in a circuit. As a Teaching Assistant, my primary focus was on assisting students in understanding the physical principles as well as obtaining mathematical expressions that govern the underlying physical laws.

PHYS 176 | COMPUTATIONAL LAB | LAB FOR LIGHT AND SOUND *Winter 2022*

Within this computational lab, students actively participated in studying the properties of various optical elements, explored the dual nature of light, and investigated the properties of sound waves. My role involved guiding students through the simulations, encouraging inquiry-based learning, and assisting them in comprehensively answering questions within the lab documents.

TUTORME

ONLINE INDEPENDENT TUTOR | TutorMe *Aug 2022 – present*

- Provided personalized, one-on-one assistance to students in mathematics, physics, and Python.
- Facilitate understanding of subjects by explaining the underlying concepts and providing guidance on assignment problems.

AMERICORPS MEMBERS (ACM) | CITY YEAR

TECHBOSTON ACADEMY | BOSTON, MA *Jul 2021 – Jun 2022*

- Facilitated class discussions and lessons for eight grade students to advance their grasp of algebra involving multiple variables.
- Held office hours to work one–on–one or in group settings with students to improve their learning. Designed and improved learning environment with partner–teacher and Academic Intervention administrator on a weekly basis.
- Organized Extended–Day activities to encourage students' participation in extracurricular activities.

AWARDS

College of Arts and Sciences Dean's Fellowship, Drexel University *2022, 2023*

Segal AmeriCorps Education Award, City Year *2022*

LEADERSHIP & ACTIVITIES

PHYSICS GRADUATE STUDENT ASSOCIATION | DREXEL UNIVERSITY

TREASURER *Jul 2023 – present*

- Manage the financial aspects to ensure the availability of funds for seamless event execution.
- Collaborated with supervisors to expedite pending payments, guaranteeing smooth event logistics.
- Strategically allocated and tracked financial resources to meet event budgets, optimizing resource utilization.
- Played a pivotal role in securing event locations by reserving suitable venues, enhancing the association's event planning capabilities.

EDUCATIONAL INSTAGRAM PAGE – CONCEPTUAL.MATHS

Established and manage an educational Instagram page dedicated to mathematical topics such as Algebra, Vectors, Pre-Calculus, and Calculus.

YOUTUBE CHANNEL – ALGEBRAIC ADVENTURES AND BEYOND

Created a YouTube channel with a primary goal of presenting derivations of mathematical expressions and their applications.

SKILLS

TECHNICAL

C | HTML | IDL | JAVA | PYTHON | MS OFFICE (WORD, POWERPOINT, EXCEL)

LANGUAGE

ENGLISH | GUJARATI | HINDI