

ANISH NINAD AGASHE

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Languages: English (native fluency); Hindi (native fluency); Marathi (native fluency)

ACADEMIC BACKGROUND

Ph. D. Physics, University of Texas at Dallas (2022)
Dissertation: The Averaging Problem in Cosmology and Macroscopic Gravity (supervisor: Mustapha Ishak)

M.S. Physics, University of Texas at Dallas (2019)

M. Sc. Physics, Indian Institute of Technology Hyderabad (India) (2017)
Thesis: CMB Non-Gaussianities from Inflation Models (supervisor: Shubho Roy)

B. Sc. (Honours) Physics, Ramjas College, University of Delhi (India) (2014)

PROFESSIONAL APPOINTMENTS

- Visiting Assistant Professor of Physics, St. Mary's College of Maryland, 2022 – present.
- Teaching Assistant, Department of Physics, University of Texas at Dallas, 2017 – 2022.
- Research Assistant, under Dr. Mustapha Ishak-Boushaki, Summer 2020.
- Chair of the seminar committee, Graduate Student in Physics (GSP), Department of Physics, University of Texas at Dallas, 2019 – 2022.

TEACHING EXPERIENCE

- St. Mary's College of Maryland (Visiting Faculty)
 - Stellar Astronomy and Cosmology (ASTR 155) (for non-science majors).
 - General Physics-I (PHYS 141) (for non-physics majors).
 - General Physics-II (PHYS 142) (for non-physics majors).
 - Astrophysics (PHYS 391) (for physics majors).
 - Statistical Physics (PHYS 473) (for physics majors).
- University of Texas at Dallas (Graduate Teaching Assistant)
 - College Physics-II (PHYS 1302) (for non-physics majors).
 - Physics Laboratory I (PHYS 2125) (for non-physics majors).
 - Mechanics (PHYS 2325) (for non-physics majors).
 - Extragalactic Astrophysics (PHYS 4392) (for physics majors).
 - Relativity-II (PHYS 5392) (graduate general relativity).
 - Cosmology (PHYS 5395) (graduate cosmology).

MENTORSHIP EXPERIENCE

- Undergraduate research supervision (St. Mary's College of Maryland)
 - Established a gravitation and cosmology research group (currently 4 members).
 - The projects investigate relativistic models of compact stars.
 - Supported by an internal grant awarded for academic year 2023-2024.
 - Supervising two students for their undergraduate thesis.
 - Guiding two students in applications for graduate schools.
- Teaching assistant supervision (St. Mary's College of Maryland)
 - Supervised undergraduate students working as teaching assistants and graders.
 - Established recitation sessions for PHYS 141 and 142 and trained students to conduct them.
- Summer research mentorship (University of Texas at Dallas)
 - Mentored students (jointly with Dr. Mustapha Ishak), visiting under the Research Experience for Undergraduates (REU) program, Summer 2021.
 - The project constituted constraining cosmological parameters in two different cosmological models.
 - The students presented their findings in a division-wide meeting.

PEDAGOGY TRAINING AND EXPERIENCE

- Graduate Teaching Certificates (University of Texas at Dallas)
 - Earned two teaching certificates (general and advanced) issued by the Centre of Teaching and Learning (CTL), University of Texas at Dallas.
 - The training involved development of original course material, lesson plans, and survey of pedagogy literature.
 - Original article 'Teaching General Relativity' received a special recognition from CTL director.
- Development and Implementation of Recitation Sessions (University of Texas at Dallas)
 - Developed material (with Dr. Mustapha Ishak) for problem solving and training sessions for PHYS 2125 (calculus based mechanics) and PHYS 1301 (algebra based mechanics).
 - Conducted the recitations based on the material.
 - Recitations made a mandatory part (as an accompanying no-credit course) of PHYS 2125.

RESEARCH INTERESTS

My field of interest is *gravitation, relativistic astrophysics, and cosmology*. Some of the topics that I am interested in or am currently working on are:

- Mean kinematics (geometric flows) in cosmology and alternate theories of gravity.
- Geometric/mathematical structure of exact space-times in general relativity.
- Gravitoelectromagnetic analogies in gravity theories.
- The geometric trinity of gravity.
- Compact star models within general relativity and modified gravity.
- The averaging problem in cosmology and the effect of back-reaction on observables.
- Lagrangian approach to cosmological perturbations.
- Inhomogeneous cosmological models and gauge invariant perturbations within them.

PUBLICATION LIST

- Ripple, J., **Agashe, A.**, Generalisation of the Tolman VII Space-time, in prep. (2023).
- **Agashe, A.**, Lagrangian Formulation of the Raychaudhuri Equation in non-Riemannian Geometry, accepted, *IJGMMP* (2023).
- **Agashe, A.**, Kinematics in Metric-Affine Geometry, *Phys. Scr.* **98** 105210 (2023).
- **Agashe, A.** and Ishak, M., Spherical and Plane Symmetric Solutions in Macroscopic Gravity, *Phys. Rev. D* **108**, 104010 (2023).
- **Agashe, A.** and Ishak, M., An Almost-FLRW Model as the Averaged Universe in Macroscopic Gravity, *Gravitation and Cosmology* **29**, 110–120 (2023).
- Yao, J., Pedersen, E. M., Ishak, M., Zhang, P., **Agashe, A.**, Xu, H. and Shan, H., Separating the Intrinsic Alignment Signal and the Lensing Signal using Self-Calibration in Photo-z Surveys with KiDS450 and KV450 Data, *Monthly Notices of the Royal Astronomical Society* **495**, 4, 3900-3919 (2020).

CONTRIBUTED TALKS

- Oral Presentation, Kinematics in Metric-Affine geometry, American Physical Society Mid-Atlantic Section Fall meeting, scheduled for November 2023.
- Oral Presentation, An Almost-FLRW Universe as the Averaged Geometry in Macroscopic Gravity, American Physical Society April meeting, April 2021.
- Oral Presentation, An Almost-FLRW Universe as the Averaged Geometry in Macroscopic Gravity, Texas Section of American Physical Society Fall meeting, November 2020.

CONFERENCE PARTICIPATION

- Werner Israel Memorial Symposium, 2023 (attended virtually).
- APS and Physical Review D special event held in conjunction with the APS April Meeting 2022, Expanding Space in Astrophysics: Wiki Edit-a-thon, 2022.
- APS Seminar, Teaching Data Science to Physicists, 2022.
- University of Texas System Academy of Distinguished Teachers' Virtual Conference on Teaching in Texas, where do we go from here, 2021.
- Texas Section of American Physical Society Spring meeting, 2021.
- American Physical Society April meeting, 2021.
- Vera Rubin Legacy Sky Survey Telescope (LSST) - Dark Energy Science Collaboration (DESC) Fall Sprint Week, 2019.
- Texas Section of American Physical Society Fall meeting, 2020.
- Texas Section of American Physical Society Fall meeting (Volunteer), 2017.
- Geometry of Space-time, Seminar series by Prof. T. Padmanabhan, 2016.

TECHNICAL SKILLS

- **Languages:** C, C++, Python.
- **Tools:** LaTeX, Gnuplot, Matlab, Maple.
- **Specialised Packages:** CosmoMC, CAMB, GRTensorIII.

AWARDS AND ACHIEVEMENTS

- Faculty development grant AY 2023-2024, St. Mary's College of Maryland.
- Teaching Assistant Award, Department of Physics, University of Texas at Dallas.
- Nominated for the graduate teaching assistant award, School of Natural Sciences and Mathematics.
- Nominated for President's Teaching Excellence Award, University of Texas at Dallas.
- Advanced Graduate Teaching Certificate, Centre of Teaching and Learning, UT Dallas.
 - A special recognition for the pedagogical essay on teaching general relativity to undergraduates.
- Graduate Teaching Certificate, Centre of Teaching and Learning, University of Texas at Dallas.
- Institute of Physics (IOP) Peer Review Excellence Programme graduate.
- Summer Research Fellowship, awarded jointly by the Indian Academy of Sciences, Indian National Science Academy, and The National Science Academy, India.
- All India Rank 283 (out of ~12000) in the entrance test for the Indian Institute of Technology.