Arka Banerjee

CONTACT INFORMATION

Fermilab Cosmic Physics Center MS127
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RESEARCH POSITIONS

Fermilab, Batavia, Illinois USA
Schramm Fellow in Theoretical Astrophysics, Dec 2020 - .

Kavli Institute for Particle Astrophysics and Cosmology, Stanford University, Stanford, California USA
KIPAC Postdoctoral Fellow, Sep 2017 - Dec 2020.

EDUCATION

University of Illinois, Urbana-Champaign, Urbana, Illinois USA

Ph.D., August 2017

- Dissertation Topic: "Cosmological Signatures of Fundamental Physics"
- Advisor: Neal Dalal

Tata Institute of Fundamental Research, Mumbai, India

M.Sc., Physics, 2011

- Dissertation Topic: "Onset of nonlinear neutrino oscillations in core collapse supernovae"
- Advisor: Amol Dighe

St. Stephen's College, Delhi, India

B.Sc., Physics, 2008

HONORS AND AWARDS

UIUC University Fellowship, Fall 2016.

UIUC University Fellowship, Spring 2013.

Outstanding Teaching Award, UIUC

- Spring 2016
- Fall 2012
- Spring 2012

Kamla Bajaj Award for Best Student in Physics Honours, St. Stephen's College, 2008.

MENTORING EXPERIENCE

Graduate student supervision for research projects:

- Adrian Bayer, UC Berkeley. *A fast particle-mesh simulation of non-linear cosmological structure formation with massive neutrinos*, arXiv:2007.13394.
- Ethan Nadler, Stanford University. *Signatures of Velocity-Dependent Dark Matter Self-Interactions in Milky Way-mass Halos*, Astrophys.J. 896 (2020) 112.
- Andrew Eberhardt, Stanford University. *Investigating the use of field solvers for simulating classical systems*, Phys.Rev.D 101 (2020) 4, 043011.

Summer supervision for undergraduate students:

- Jacob Stanton, Brown University.

Teaching Experience

Senior Teaching Assistant

Quantum Mechanics and Statistical Physics, UIUC

- Fall 2016

Teaching Assistant

Quantum Mechanics and Statistical Physics, UIUC

- Spring 2016
- Spring 2012
- Fall 2011

Special Relativity and Math Applications, UIUC

- Fall 2012

Graduate course in Electromagnetism, TIFR

- Fall 2010

Professional Service

Referee for JCAP, PRD, ApJ, MNRAS.

Conferences and Meetings Organized

KIPAC Postdoctoral Lunch Talks, 2018-present.

KIPAC Hack Day, May 2019.

Local Group Meeting (Stanford, UC Berkeley, UC Davis) on Local Group Science, November 2019.

Computing skills and experience

Programming Languages: C, C++, Python, Mathematica, LaTeX.

Extensive experience in cluster computing and parallel computing.

Publications

Bayer, **Banerjee**, and Feng, *A fast particle-mesh simulation of non-linear cosmological structure formation with massive neutrinos*,
accpeted to JCAP.

Banerjee, and Abel, *Nearest Neighbor distributions: new statistical measures for cosmological clustering*,
accepted to MNRAS.

Aviles, **Banerjee**, *A Lagrangian Perturbation Theory in the presence of massive neutrinos*,
JCAP 10 (2020) 034.

Fang, **Banerjee**, Charles, Omori, *A Cross-Correlation Study of High-energy Neutrinos and Tracers of Large-Scale Structure*,
The Astrophysical Journal, Volume 894, Number 2.

Nadler, **Banerjee**, Adhikari, Mao, Wechsler, *Signatures of Velocity-Dependent Dark Matter Self-Interactions in Milky Way-mass Halos*,
Astrophys.J. 896 (2020) 112.

Eberhardt, **Banerjee**, Kopp, Abel, *Investigating the use of field solvers for simulating classical systems*,
Phys.Rev.D 101 (2020) 4, 043011.

Uhlemann, Friedrich, Villaescusa-Navarro, **Banerjee** , Codis, *Fisher for complements: Extracting cosmology and neutrino mass from the counts-in-cells PDF*,
MNRAS, Volume 495, Issue 4, July 2020.

Villaescusa-Navarro, Hahn, Massara, **Banerjee** *et al.*, *The Quijote simulations*,

Astrophys.J.Suppl. 250 (2020) 1, 2.

McClintock, Rozo, **Banerjee** *et al.*, *The Aemulus Project IV: Emulating Halo Bias*, arXiv:1907.13167.

Banerjee *et al.*, *Weighing neutrinos with the halo environment*, JCAP 06 (2020) 032.

Banerjee *et al.*, *Signatures of Self-Interacting dark matter on cluster density profile and subhalo distributions*, JCAP 02 (2020) 024.

Chuang *et al.*, *UNIT project: Universe N-body simulations for the Investigation of Theoretical models from galaxy surveys*, MNRAS, Volume 487, Issue 1, July 2019.

Banerjee, Powell, Abel, and Villaescusa-Navarro, *Reducing Noise in Cosmological N-body Simulations with Neutrinos*, JCAP 1809, no. 09, 028 (2018).

Secco, Farah, Jain, Adhikari, **Banerjee**, and Dalal, *Probing Self-interacting Dark Matter with Disk Galaxies in Cluster Environments*, Astrophys.J. 860 (2018) no.1, 32.

Villaescusa-Navarro, **Banerjee**, Dalal, Castorina, Scoccimaro, Angulo, and Spergel, *The imprint of neutrinos on clustering in redshift-space*, Astrophys.J. 861 (2018) no.1, 53.

Banerjee, Jain, Dalal, and Shelton, *Tests of Neutrino and Dark Radiation Models from Galaxy and CMB surveys*, JCAP 1801 (2018) 01, 022.

Banerjee, and Dalal, *Simulating nonlinear cosmological structure formation with massive neutrinos*, JCAP (2016) 11 015.

Banerjee, Dighe, and Raffelt, *Linearized flavor-stability analysis of dense neutrino streams*, Phys.Rev. D84 (2011) 053013.

Home, Pan, and **Banerjee**, *Larmor precession reexamined: Testable correction and its ramifications*, Eur. Phys. J. D, 67, 72(2013).

Home, Pan, and **Banerjee**, *Quantitative probing of quantum-classical transition for the arrival time distribution*, J. Phys. A: Math. Theor. 42, 165302 (2009).

Other Contributions

Drlica-Wagner *et al.*, *Probing the Fundamental Nature of Dark Matter with the Large Synoptic Survey Telescope*, arXiv:1902.01055.

Bechtol *et al.*, *Dark Matter Science in the Era of LSST*, arXiv:1903.04425.

Rhodes *et al.*, *The End of Galaxy Surveys*, http://adsabs.harvard.edu/abs/2019BAAS...51c.114R

Talks and Presentations

Weighing neutrinos with the Large Scale Structure of the Universe, ICTS, Bangalore, March 2020.

Weighing neutrinos with the Large Scale Structure of the Universe, IISC, Bangalore, March 2020.

Signatures of Dark Matter Self-Interactions in the Milky Way, Local Group Meeting, Stanford, November, 2019.

Signatures of Self-Interacting dark matter on cluster density profile and subhalo distributions, Cosmic Controversies Conference, Chicago, October 2019.

Signatures of Self-Interacting dark matter on cluster density profile and subhalo distributions, LSST

Dark Matter Workshop, U. Chicago, August 2019.

Signatures of Self-Interacting dark matter on cluster density profile and subhalo distributions, New York University, June 2019.

Massive neutrinos and environmental scale dependence, Cosmology Seminar, ICTS Bangalore, January 2019.

Imprints of massive neutrinos on Large Scale Structure, IMSC Chennai, January 2019.

Cosmology with massive neutrinos, INPA Seminar, Lawrence Berkeley Laboratory, October 2018.

Massive Neutrinos and the Environmental Scale Dependence of Halo Bias, Nonlinear Universe Conference, Smartno, July 2018.

Reducing Noise in Cosmological N-body simulations with neutrinos, KIPAC Tea, SLAC, January 2018.

Reducing Noise in Cosmological N-body simulations with neutrinos, Cosmology Lunch, Princeton University, December 2017.

Imprints of massive neutrinos on Large Scale Structure, Cosmology Seminar, UC Davis, October 2017.

Cosmological effects of massive neutrinos, IIT Bombay, August 2017.

Void biasing in the presence of massive neutrinos, LBL, April 2017.

Simulating nonlinear structure formation with massive neutrinos,
KIPAC, Stanford University, March 2017.

Cosmological structure formation with massive neutrinos, IPMU, Tokyo, February 2017.

Simulating nonlinear structure formation with massive neutrinos, CCAPP, Ohio State University, January 2017.

Large scale biasing of voids in the presence of massive neutrinos, University of Pennsylvania, August 2016.

Simulating cosmologies with "fast" particles, Santa Fe Cosmology Workshop, July 2014.

References

Prof. Tom Abel
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Stanford University
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Prof. Risa Wechsler
Department of Physics
Stanford University
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Prof. Neal Dalal
Perimeter Institute
Waterloo, Ontario N2L 2Y5
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Prof. Andrey Kravtsov
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