Sownak Bose

Institute for Computational Cosmology, Department of Physics, South Road, Durham, DH13LE, UK

sownak.bose@durham.ac.uk | sownakbose.github.io | ADS profile

Employment

Institute for Computational Cosmology, Durham University — *Durham, UK*

Associate Professor & UKRI Future Leaders Fellow — *Aug. 2023 - PRESENT*

- Previous: Assistant Professor (Oct. 2021 - Aug. 2023)

Faculty of Science, Durham University — *Durham, UK*

Deputy Executive Dean for People & Culture — *Jan. 2023 - Mar. 2024*

- Responsible for constructing and delivering the Equality, Diversity, and Inclusion strategy across the Faculty of Science.

Center for Astrophysics | Harvard & Smithsonian — *Cambridge, MA, USA*

ITC Postodoctoral Fellow — *Sept. 2017 - Aug. 2021*

Education

Institute for Computational Cosmology, Durham University — *Durham, UK*

PhD in Astrophysics — *Oct. 2013 - Mar. 2017*

- Thesis: "Beyond ΛCDM: Exploring Alternatives to the Standard Cosmological Paradigm"

St. Catherine's College, University of Oxford — *Oxford, UK*

Master of Physics (MPhys) — *Oct. 2009 - Jun. 2013*

- Thesis: "Gauge theories and *dessins d'enfants*: beyond the torus"

Awards & Scholarships

Personal

2025	**Excellence in Project Supervision** Award based on nominations made by students whom I have supervised for their MSc theses	*Durham University*
2023	**IOP Publishing Top Cited Paper Award** Recognising the most cited papers from North America published across the entire IOP Publishing journal portfolio within the past three years (2020 to 2022), and also featuring in the top 1% of most cited articles in the Astronomy and Astrophysics subject category; awarded for co-authored publication *"Rapid Reionization by the Oligarchs"*.	*IOP Publishing*
2021	**Buchalter Cosmology Prize** Rewarding 'new ideas or discoveries that have the potential to produce a breakthrough advance in our understanding of the origin, structure, and evolution of the universe'; awarded for co-authored publication *"First star-forming structures in fuzzy cosmic filaments"*.	*Buchalter Research Foundation*
2018	**Royal Astronomical Society Michael Penston Prize** Awarded for the 'best doctoral thesis in astronomy and astrophysics in the UK'	*RAS*
2018	**Springer Thesis Prize** Award recognising 'outstanding PhD research' internationally.	*Springer*
2018	**Winton Doctoral Prize** Awarded for the 'best PhD in Physics using computational methods'	*Winton Capital*
2016	**Keith Nicholas Postgraduate Prize** Awarded for 'outstanding overall performance' by a postgraduate student in the Physics department	*Durham University*

Grants

2025-2028	**UKRI Future Leaders Fellowship (renewal)** Worth £567k for the programme entitled "Fundamental Cosmology in the Era of Surveys: a Multi-scale Numerical Campaign" (PI)	*UK Research and Innovation*
2024	**Miracle or Mirage? Spectroscopic Confirmation of Remarkably Luminous Galaxies at z>10** Cycle 3, 33.4 hours of observing time (worth $3.5m based on operation costs)	*James Webb Space Telescope*
2022-	**Supercomputing time** More than 140M CPU hours of computing time secured as PI; more than 350M CPU hours of computing time secured as co-I	*DiRAC HPC Facility*
2021-2025	**UKRI Future Leaders Fellowship** Awarded an independent research fellowship worth £1.2m for the programme entitled "Fundamental Cosmology in the Era of Surveys: a Multi-scale Numerical Campaign" (PI)	*UK Research and Innovation*
2017-2021	**ITC Fellowship** Awarded an independent research fellowship worth $344,000 for the programme entitled"Testing the nature of dark matter and dark energy in the era of precision cosmology" (PI)	*Harvard University*
2019-2020	**ASCR Leadership Computing Challenge** Awarded 300,000 node hours on Summit Supercomputing Facility for "Abacus2020: N-body Simulations for Precision Cosmology with DESI." (Co-I; PI: Daniel Eisenstein)	*Oak Ridge National Laboratory*
2018-2020	**Beyond Ultra-deep Frontier Fields and Legacy Observations (BUFFALO)** Cycle 25, Awarded 101 orbits, Proposal ID: #15117, worth £5m based on operation costs (Co-I; PI: Charles Steinhardt, Mathilde Jauzac)	*Hubble Space Telescope*

Mentorship

Postdocs

2023-	Dr. Alejandra Aguirre-Santaella	*Durham University*
2023-	Dr. Shengdong Lu	*Durham University*
2022-	Dr. Daniele Sorini	*Durham University*

Graduate students

2024-	**MScR,** Harshnoor Kaur	*Durham University*
2023-2024	**MScR,** Jinning Liang	*Durham University*
2022-	**PhD,** Mac McMullan	*Durham University*
2022-	**PhD,** Joaquin Sureda	*Durham University*
2022-	**PhD,** Sarah Johnston	*Durham University*
2022-	**PhD,** Michael Collier	*Durham University*
2022-2024	**PhD,** Haonan Zheng	*Durham University*
2021-	**PhD,** Yuchan Wang	*Durham University*
2020-2024	**PhD,** Ana Maria Delgado (with Prof. Lars Hernquist)	*Harvard University*
2018-2022	**PhD,** Boryana Hadzhiyska (with Prof. Daniel Eisenstein & Prof. Lars Hernquist)	*Harvard University*

Undergraduate students

2024-2025	**MSc,** Shivani Ramesh	*Durham University*
2024-2025	**MSc,** Grzegorz Moson	*Durham University*
2023-2024	**MSc,** Oscar Veenema	*Durham University*
2022-2024	**Research intern,** Yash Gondhalekar	*BITS Pilani*
2022-2024	**Research intern,** Bipradeep Saha	*IISER Kolkata*
2022-2023	**MSc,** Kit Haworth	*Durham University*
2020	**Research intern,** Ali Kurmus (PRISE Fellowship recipient)	*Harvard University*
2020	**Research intern,** Victoria Ono (HCRP Fellowship recipient)	*Harvard University*
2020	**Research intern,** Diana Khimey (PRISE Fellowship recipient)	*Harvard University*
2019-2021	**Senior thesis,** Mahlet Shiferaw	*Harvard University*
2019-2020	**Senior thesis,** AJ Cohn	*Harvard University*
2019	**Junior thesis,** Gennie Weiler	*Harvard University*
2018	**Junior thesis,** Mahlet Shiferaw	*Harvard University*
2018	**REU student,** Thomas Boudreaux (with Dr. Idan Ginsburg)	*Harvard University*
2015-16	**MSc,** Adam Welsh (with Prof. Tom Theuns)	*Durham University*

Teaching

2025-	**Postgraduate lecture course** on galaxy formation theory	*Durham University*
2023-	**Postgraduate lecture course** on numerical simulations of galaxy formation	*Durham University*
2023	**Lecturer at summer school** on Precision Cosmology in the Era of Big-Data Surveys	*Warsaw, Poland*
2019-2022	**Online Course Creator** in Standard & Higher Level Physics for the International Baccalaureate	*IB Better*
2011-2022	**Teacher** in Higher Level Physics & Mathematics for the International Baccalaureate	*Lanterna Education*
2019	**Guest lecturer** for Ay98 (Research Tutorial in Astrophysics for undergraduates)	*Harvard University*
2019	**Guest lecturer** at summer school in astrophysics for high school students	*Harvard University*
2019	**Guest lecturer** at the Banneker Institute Summer Program	*Harvard University*
2018	**Guest lecturer** for Ay98 (Research Tutorial in Astrophysics for undergraduates)	*Harvard University*
2016-2017	**Workshop demonstrator** in Planets & Cosmology, for undergraduates in their penultimate year	*Durham University*
2014-2016	**Workshop demonstrator** in Classical & Quantum Mechanics, for undergraduates in their second year	*Durham University*
2013-14	**Marker** for Large-Scale Structure & General Relativity, for Masters students in Theoretical Astrophysics	*Durham University*

Professional Activities & Service

Talks 15+ invited reviews and plenaries (2018-2025), 40+ invited seminars, colloquia, and conference talks (2016-2025). 20+ public engagement talks delivered at science festivals, local schools, astronomical societies, and outreach events.

Peer review The Astrophysical Journal (**ApJ**, since May 2020), Physical Review D (**PRD**, since Jan. 2020), Physical Review Letters (**PRL**, since Apr. 2019), Journal of Cosmology and Astroparticle Physics (**JCAP**, since May 2018), International Journal of Modern Physics D. (**IJMPD**, since May 2017), Monthly Notices of the Royal Astronomical Society (**MNRAS**, since Aug. 2016). Wxpert scientific reviewer for the Royal Society University Research Fellowship (URF), the UKRI Future Leaders Fellowship (FLF), Enrico Fermi Fellowships, and for Dutch and Swiss national fellowship competitions on multiple occasions (2022-).

Committees **ITC Postdoctoral Fellowship** Selection Committee (2017-2021), **Durham postdoc** selection committee (2021, 2023, 2024), **Durham PhD** selection committee (2023-2025), **Chair of multiple tenure-track selection committees** in Faculty of Science (2023-), Member of **Durham University's Institutional Athena Swan** committee, the **Race Equality Charter Action Plan Delivery Group**, the **Chinese Scholarship Council selection panel** (Science), Steering Committee of the **Virgo Consortium**.

Organisation **ITC Luncheon** co-organiser (2018-2019), **Durham Astronomy Colloquium** organiser (2022–), **CosmICConnections** Theory Meeting organiser (2022-), **Durham IDEA** (Integration, Diversity, Equity and Accessibility) meeting co-organiser (2021-2022), **DESI Collaboration meeting** organisation (2023), **Small Galaxies, Cosmic Questions conference** organiser (2024), **UK National Astronomy Meeting** co-organiser (2025), **Astronomy PG Course** Co-director (2025-)

Media & Outreach (selected)

2024	**The Stargoal Project** Co-creator of this project connecting football and Physics that produced educational films with primary school children, in association with Education Durham. Winner of the 2024 Ogden Outreach Award for 'best project (nationally) for engagement with schools'.	*Website*
2022	**Durham Astro Girls' Day** Co-organiser of inaugural all-day event in Durham astronomy	*Website*
2021-	**The Open Universe Podcast** (Co-created with Ana Bonaca) bringing cutting-edge astronomy research to the public	*TheOpenUniverse*
2021	**NOVA: Universe Revealed** Contributor to two episodes; broadcast in the UK and USA	*PBS Nova*
2015-2021	**Söderberg & Partners Summer Camp** Popular science lectures in Physics & Astronomy	*Sigtuna, Sweden*
2017	**Gravity & Me: The Force that Shapes Our Lives** Contributor to BBC science programme on the nature of gravity in our Universe	*BBC4*
2017	**This is Durham: Place of Light** Represented the Institute for Computational Cosmology at the invitation of MP Kevan Jones	*House of Commons, Westminster, UK*
2016	**Celebrate Science** Demonstrator for 'Galaxy Makers' exhibit	*Durham, UK*
2016	**Royal Society Summer Exhibition** Co-developer of the Oculus Rift fly-through of the simulated universe	*London, UK*
2015	**Lumiere Light Festival** Core team member responsible for projecting the eagle cosmological simulations on Durham Cathedral	*Durham, UK*
2013	**Stockholm Science Event** Invited by the British Council to talk about dark matter in Stockholm	*Stockholm, Sweden*

Selected high-impact publications

Statistical summary: 109 publications with 6500+ citations, h-index$= 43$. 2 papers with 300+ citations, 5 papers with 200+ citations, 16 papers with 100+ citations. Underlined names indicate publications led by undergraduate students, graduate students, or postdocs I have supervised directly.

1. R. Naidu, P. A. Oesch, ..., **Bose, S.**, et al. arXiv:2505.11263, May 2025.
2. R. Naidu, P. A. Oesch, ..., **Bose, S.**, et al. arXiv:2503.16596, March 2025.
3. Y. Gondhalekar, **Bose, S.**, et al. MNRAS, 536(2):1408–1427, January 2025.
4. D.Sorini, **Bose, S.**, et al. MNRAS, 536(1):728–751, January 2025.
5. S. Lu, C. S. Frenk, **Bose, S.**, et al. MNRAS, 536(1):1018–1034, January 2025.
6. M. Collier, **Bose, S.**, and B. Li. MNRAS, 534(3):2204–2220, November 2024.
7. H. Zheng, **Bose, S.**, et al., MNRAS, 532(3):3151–3165, August 2024.
8. H. Zheng, **Bose, S.**, et al., MNRAS, 528(4):7300–7309, March 2024.

9. **Bose, S.**, B. Hadzhiyska, et al. MNRAS, 524(2):2579–2593, September 2023.
10. R. Pakmor, V. Springel., ..., **Bose, S.**, et al. MNRAS, 524(2):2539–2555, September 2023.
11. A. M. Delgado, B. Hadzhiyska, ..., **Bose, S.**, et al. MNRAS, 523(4):5899–5914, August 2023.
12. **Bose, S.** and A. J. Deason. MNRAS, 522(4):5013–5021, July 2023.
13. R. Naidu, P A. Oesch, ..., **Bose, S.**, et al. arXiv:2208.02794, August 2022.
14. **Bose, S.**, D. J. Eisenstein, et al. MNRAS, 512(1):837–854, May 2022.
15. A. J. Deason, **Bose, S.**, et al. MNRAS, 511(3):4044–4059, April 2022.
16. N. A. Maksimova, L. H. Garrison, ..., **Bose, S.**, et al. MNRAS, 508(3):4017–4037, December 2021.
17. D. Khimey, **Bose, S.** and S. Tacchella. MNRAS, 506(3):4139–4150, September 2021.
18. **Bose, S.** and A. Loeb. ApJ, 912(2):114, May 2021.
19. J. Wang, **Bose, S.**, et al. Nature, 585(7823):39–42, September 2020.
20. R. Naidu, S. Tacchella, ..., **Bose, S.**, et al. ApJ, 892(2):109, April 2020.
21. B. Hadzhiyska, **Bose, S.**, et al. MNRAS, 506(4):4139–4150, September 2021.
22. B. Hadzhiyska, **Bose, S.**, et al. MNRAS, 493(4):5506–5519, April 2020.
23. **Bose, S.**, A. J. Deason, et al. MNRAS, 495(1):743–757, May 2020.
24. P. Mocz, A. Fialkov, ..., **Bose, S.**, et al. Phys. Rev. Lett., 123:141301, Oct 2019.
25. **Bose, S.**, D. J. Eisenstein, et al. MNRAS, page 2192, Sep 2019.
26. **Bose, S.**, M. Vogelsberger et al., MNRAS, 487(1):522–536, Jul 2019.
27. **Bose, S.**, C. S. Frenk, et al. MNRAS, 486(4):4790–4804, Jul 2019.
28. S.Tacchella, **Bose, S.**, et al. ApJ, 868(2):92, Dec 2018.
29. **Bose, S.**, A. J. Deason, and C. S. Frenk. ApJ, 863:123, August 2018.
30. **Bose, S.**, I. Ginsburg, and A.Loeb. ApJ, 859:L13, May 2018.
31. **Bose, S.**, B. Li, et al., J. Cosmology Astropart. Phys., 2:050, February 2017.
32. **Bose, S.**, W. A. Hellwing et al. MNRAS, 464:4520–4533, February 2017.
33. **Bose, S.**, C. S. Frenk et al. MNRAS, 463:3848–3859, December 2016.
34. A. D. Ludlow, **Bose, S.**, et al., MNRAS, 460:1214–1232, August 2016.
35. **Bose, S.**, W. A. Hellwing, et al. MNRAS, 455:318–333, January 2016.
36. H. A. Winther, F. Schmidt, ..., **Bose, S.**, et al. MNRAS, 454(4):4208–4234, December 2015.
37. **Bose, S.**, W. A. Hellwing, and B. Li. J. Cosmology Astropart. Phys., 2:034, February 2015.
38. **Bose, S.**, J. Gundry, and Y.-H. He. Journal of High Energy Physics, 1:135, January 2015.