

Sownak Bose

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British citizen, DOB: 22 January, 1992

Employment

Center for Astrophysics | Harvard & Smithsonian

Cambridge, MA, USA

ITC POSTDOCTORAL FELLOW

Sept. 2017 - PRESENT

- Current research interests include: large-scale structure, the galaxy-halo connection, reionisation and the formation of the first galaxies, ultra-faint dwarf galaxies and near-field cosmology, the formation and evolution of globular clusters.
- Extensive experience in the running and analysis of cosmological simulations, generating initial conditions for cosmological zoom simulations, expertise in the development and use of semi-analytic galaxy formation models, simulations of non-standard dark matter and modified gravity.

Education

Institute for Computational Cosmology, Durham University

Durham, UK

PHD IN ASTROPHYSICS

Oct. 2013 - Mar. 2017

- Thesis: “Beyond Λ CDM: Exploring Alternatives to the Standard Cosmological Paradigm”
- Advisors: Prof. Carlos Frenk, Prof. Baojiu Li, and Prof. Adrian Jenkins
- Examiners: Prof. Matteo Viel and Prof. Carlton Baugh

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”
- Advisor: Prof. Yang-Hui He

Awards & Scholarships

PERSONAL

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. Thesis published by Springer	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
2012	Master's Book Prize Awarded by St. Catherine's College for undergraduate exam performance	Oxford University
2012	IoP/Nuffield Bursary Awarded to facilitate undergraduate summer research	Institute of Physics
2011	Master's Book Prize Awarded by St. Catherine's College for undergraduate exam performance	Oxford University
2011	Physics Oral Prize Awarded for the ‘best student talk’ as voted by undergraduates in St. Catherine's College	Oxford University

GRANTS

2019/20	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
2018-20	Beyond Ultra-deep Frontier Fields and Legacy Observations (BUFFALO) Awarded 101 orbits, Proposal ID: #15117 (Co-I; PI: Charles Steinhardt, Mathilde Jauzac)	HST Cycle 25

Press coverage

Formation of the first galaxies

ARXIV:1802.10096

Aug. 2018

- Research on the identification of pre- and post-reionisation populations of dwarf galaxies reported extensively in world media (TV, radio, print and Internet), including coverage on the **BBC**, Sky News, The Independent, The New Scientist, **USA Today**, **Popular Mechanics**, **Gizmodo** and more than 100 other media outlets.

Mentorship

SUPERVISION

2018 - PRESENT	Graduate advisor (PhD, with Prof. Daniel Eisenstein, Prof. Lars Hernquist, and Prof. David Spergel), Boryana Hadzhiyska, on proposed thesis on “The Clustering of Galaxies in Hydrodynamical Simulations”	Harvard University
2019 - PRESENT	Thesis advisor (Senior), Mahlet Shiferaw, on “Generating Mock Galaxy Catalogs in Modified Theories of Gravity”	Harvard University
2019 - PRESENT	Thesis advisor (Senior), AJ Cohn, on “Testing Observational Systematics in Inferring the Density Profiles of Rich Clusters”	Harvard University
2019 - PRESENT	Thesis advisor (Junior), Gennie Weiler, on “Numerical Simulations of Globular Cluster Disruption in Galactic Haloes”	Harvard University
Fall 2018	Thesis advisor (Harvard junior), Mahlet Shiferaw, on “The Large-Scale Clustering of Galaxies in a Warm Dark Matter Universe”	Harvard University
Summer 2018	Co-advisor (with Dr. Idan Ginsburg) for REU summer student, Thomas Boudreaux, on “The Effects of Primordial Binary Fraction on Globular Cluster Evolution”	Harvard University
2015/16	Co-advisor (MSc., with Prof. Tom Theuns), Adam Welsh, on “Astrophysical Constraints on the Nature of Dark Matter”	Durham University

TEACHING

2011 - PRESENT	Teacher in Higher Level Physics & Mathematics for the International Baccalaureate	Lanterna Education
Summer 2019	Guest lecturer at summer school in astrophysics for high school students	Harvard University
Summer 2019	Guest lecturer at the <u>Banneker Institute Summer Program</u>	Harvard University
Fall 2018	Guest lecturer for Ay98 (Research Tutorial in Astrophysics for undergraduates)	Harvard University
2016/17	Workshop demonstrator in Planets & Cosmology, for undergraduates in their penultimate year	Durham University
2014/15/16	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

Media & Outreach (selected)

2015 - PRESENT	Söderberg & Partners Summer Camp Popular science lectures in Physics & Astronomy	Sigtuna, Sweden
2018, 2019	Cambridge Explores the Universe Organised my own activity on “Bending the Universe with an Xbox Kinect”	Cambridge, MA, USA
Mar. 2017	Gravity & Me: The Force that Shapes Our Lives Contributor to BBC science programme on the nature of gravity in our Universe	BBC4
Feb. 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
Oct. 2016	Celebrate Science Demonstrator for ‘Galaxy Makers’ exhibit	Durham, UK
Jul. 2016	Royal Society Summer Exhibition Co-developer of the Oculus Rift fly-through of the simulated universe	London, UK
Jan. 2016	Durham University Space Day Team leader for a group of schoolchildren	Durham, UK
Nov. 2015	Lumiere Light Festival Core team member responsible for projecting the eagle cosmological simulations on Durham Cathedral	Durham, UK
Apr. 2015	Schools’ Science Festival Demonstrator for ‘How to build a spectrograph’	Durham, UK
2014, 2015	Celebrate Science Demonstrator for interactive gravitational lensing demo	Durham, UK
Dec. 2013	Stockholm Science Event Invited by the British Council to talk about dark matter in Stockholm Central Station	Stockholm, Sweden

Recent Talks (10 invited, more than 40 in total)

Shanghai Assembly on Cosmology & Galaxy Formation	Shanghai, China
THE SMALL(EST)-SCALE STRUCTURE IN COLD DARK MATTER (invited)	Nov. 2019
ASPEN Center for Physics Summer Program	Aspen, Colorado, USA
NON-STANDARD COSMOLOGY PROBES	Aug. 2019

Small Galaxies, Cosmic Questions

PROBING THE NATURE OF DARK MATTER WITH COSMIC REIONISATION (invited)

NORDITA 'Zoom-In and Out' IGM workshop

SMALL-SCALE STRUCTURE & THE NATURE OF DARK MATTER THROUGH THE EYES OF THE IGM

ITC Battlestar Galactica

THE GALAXY-HALO CONNECTION (invited)

Royal Society Michael Penston Prize Lecture

COSMOLOGY BEYOND COLD DARK MATTER (invited)

IGM2018: Revealing Cosmology and Reionization History with the Intergalactic Medium

HOW THE PRESENT-DAY DISTRIBUTION OF DWARF GALAXIES ENCODES THE PHYSICS OF REIONISATION

KITP Workshop On Cold Dark Matter

THE SMALL(EST) SCALE STRUCTURE IN COLD DARK MATTER

ITC Luncheon

HOW THE PRESENT-DAY DISTRIBUTION OF DWARF GALAXIES ENCODES THE PHYSICS OF REIONISATION

Columbia University Astronomy Seminar

HOW THE PRESENT-DAY DISTRIBUTION OF DWARF GALAXIES ENCODES THE PHYSICS OF REIONISATION (invited)

Supercomputing Frontiers Europe 2018

SIMULATING THE FORMATION OF STRUCTURE ON SUPERCOMPUTERS (invited)

Sterile Neutrino Dark Matter workshop

REIONISING THE UNIVERSE WITH STERILE NEUTRINOS (invited)

Durham, UK

Aug. 2019

Stockholm, Sweden

Jul. 2019

Cambridge, MA, USA

Apr. 2019

London, UK

Jan. 2019

Tokyo, Japan

Sep. 2018

Santa Barbara, CA, USA

Apr. 2018

Cambridge, MA, USA

Apr. 2018

New York City, NY, USA

Mar. 2018

Warsaw, Poland

Mar. 2018

Leiden, The Netherlands

Mar. 2018

Professional Service

Peer review

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)

PRESENT

Organisation

ITC LUNCHEON CO-ORGANISE: WEEKLY SEMINAR SERIES ATTENDED BY ~90 ASTRONOMERS WITH TALKS FROM FOUR SPEAKERS

FROM A RANGE OF INTERESTS IN ASTRONOMY, SOCIAL WELFARE IN ACADEMIA ETC.

2018/19

Committees

ITC POSTDOCTORAL FELLOWSHIP SELECTION COMMITTEE

2017, 2018, 2019

Computing

Programming Python, Fortran90, C, HPC, MPI, UNIX, \LaTeX , Mathematica
Simulation codes GADGET, Arepo, RAMSES, NBODY6++