Curriculum Vitae

Updated: November 26, 2020

Sagnick Mukherjee

Personal Information

Date of Birth:	October 13, 1997
Nationality:	Indian
Address (Residential):	C-1/9, East Enclave, Newtown Rajarhat, Kolkata, West Bengal India, 700163 Phone +91 9007476360
Designation:	Graduate Student Department of Astronomy and Astrophysics University of California, Santa Cruz 1156 High Street, Santa Cruz, California 95064, USA
Email:	sagnickm@yahoo.in
Email:	samukher@ucsc.edu
Website:	https://sagnickm.github.io

Academic Qualification

Examination / Degree	Board / Institute	Subjects	Year	Percentage/ Grade Points
All India Secondary School Examination (10^{th} Grade)	Central Board of Secondary Education	General Stream including English	2013	10/10
All India Senior School Certificate Examination (12th Grade)	Central Board of Secondary Education	English, Chemistry, Biology English, Mathematics, Physics	2015	94.8%
Bachelor of Science	Presidency University	Physics Major	2018	Major: 9.21/10 GenEd: 7.60/10
Master of Science	Presidency University	Physics Major	2020	9.65/10

Research Interests

I work on characterization of atmospheres of planets revolving around extrasolar stars. These planets are called exoplanets and I try to model and infer their atmospheric compositon and structure. I am currently working on modeling the reflected light, polarization signals and cloud structures of exoplanets for present/upcoming ground and space-based telescopes. I have also worked on observations of AGN feedback in high redshift galaxies and also the modeling of radiative processes of a class of active galaxies called blazars and comparing my theoretical model with observational data to constraint the physics of such objects. I am currently finishing up a project on stellar variability in the Andromeda galaxy. I maintain a broad interest in other fields of astrophysics like planet formation and galaxy evolution as well.

Publications

1. 'X-Ray Surface Brightness Profiles of Optically Selected Active Galactic Nuclei: Comparison with X-Ray AGNs', **Sagnick Mukherjee**, Anirban Bhattacharjee, Suchetana Chatterjee, Jeffrey A. Newman, Renbin Yan, (February 2019, The Astrophysical Journal (ApJ), Volume 872, Number 1) (Click here to see the paper).

2. 'The accretion disc-jet connection in blazars', **Sagnick Mukherjee**, Kaustav Mitra, Ritaban Chatterjee, (June 2019, Monthly Notices of the Royal Astronomical Society (MNRAS), Volume 486, Issue 2) (Click here to see the paper).

Observational Experience

1. Optical Spectroscopy Observation of variable stars in the Andromeda galaxy at Shane 3-m optical telescope, Lick Observatory with PI Prof. Puragra GuhaThakurta and Co-I Mr. Rafael Nunez, Undergraduate, UCSC, Summer 2019.

Contributed Talks and Posters

1. Contributed Talk , 'Cloud Complexity Required for Retrievals on Reflected Spectroscopy of Cool Giants', September 2020, Bay Area Exoplanet Meeting 34.
2. Public Lecture , 'First Light from the Edge of a Black Hole', Summer 2019, Presision- The Undergraduate Physics Symposium, 2019.
3. Contributed talk, 'The accretion disc-jet connection in blazars', 37th Annual meeting of the Astronomical Society of India , Christ University, Bangalore, Spring 2019.
4. 'Active Galactic Nuclei', presented in the National Summer School on Statistical Physics, Summer 2018, S.N.Bose National centre for Basic Sciences, Kolkata.
5. 'Disc-Jet connection in Blazars', presented in the B.Sc thesis presentations, Presidency University, Summer 2018.
6. Poster Presentation, 'X-ray surface brightness profiles of optically selected Active galactic nuclei:Comparison with X-ray AGN', 36th Annual meeting of the Astronomical Society of India , Osmania University, Hyderabad, Spring 2018.
7. Contributed Talk, 'X-ray Environment of Active and Normal Galaxies' , Summer 2017, Presision-The Physics Undergraduate Symposium, 2017
8. 'X-ray Surface Brightness Profile of AGN", Galaxy Lunch Talk, Inter University Center for Astronomy and Astrophysics (IUCAA), Summer 2017.
9. 'Probing the Compton Effect Experimentally', Quantum Mechanics Term Paper Presentations, Spring 2017.
10. 'X-ray Environment of Active and Normal Galaxies', Science Day Celebration at S.N. Bose Centre for Basic Sciences, Spring 2017.

Project Work

1. "Modeling Polarization Signals from Exoplanets and Brown Dwarfs". Project Mentor: Prof. Jonathan Fortney, Dr. Rebecca Jensen-Clem, UC Santa Cruz, Santa Cruz. Duration: August 2020 − .
2. "Cloud Complexity Required for Retrievals on Reflected Spectroscopy of Cool Giants". Project Mentor: Dr. Natasha E. Batalha, Prof. Mark S. Marley, NASA Ames Research Centre, Mountain View. Duration: January 2020 − .
3. 'Photometrically Variable Stars in the Andromeda Galaxy'. M.Sc thesis project. Project Mentor: Prof. Puragra Guhathakurta, Professor, University of California, Santa Cruz. Duration: September 2018 − .
4. 'The Exoplanet Cloud Modeling Code- VIRGA '. Project Mentor: Dr. Natasha Batalha, Research Space Scientist, NASA Ames Research Center, CA. Duration: June 2019 − February 2020 .
5. ' Spectroscopic Follow-up of ZTF alerts in M31: Novae and Luminous Variable Stars", PI-Prof. Puragra Guhathakurta, UCSC. Co-I: Dr. Monika Soraisam (NOAO), Dr. Chien-Hsiu Lee (NOAO), Sagnick Mukherjee, Rafael Nunez (UCSC), Amanda Quirk (UCSC). Duration July 2019 − January 2020.
6. ' X-ray binary population in high redshift galaxies: Implications for GW detections '. Advisor: Prof. Suchetana Chatterjee, Assistant Professor, Presidency University, Kolkata. Collaborators: Saugata Barat, M.Sc Student, Presidency University, Kolkata. Kaustav Mitra , Graduate Student, Yale University. Duration January 2019 − January 2020.
7. 'Disk-Jet connection in Blazars'. B.Sc. thesis project. Project Mentor: Prof. Ritaban Chatterjee, Assistant Professor, Presidency University, Kolkata. Duration: January 2018 − May 2018.
8. 'X-ray Surface Brightness Profiles of Optically Selected Active Galactic Nuclei: Comparison with X-ray AGN '. JBNSTS Project. Project Mentor: Prof. Suchetana Chatterjee, Assistant Professor, Presidency University, Kolkata. Duration: January 2016 − May 2017.
9. 'Characterizing the beam spread in the e/m measurement setup for electrons'. MSc Laboratory Project. Advisor: Prof. Saumyadip Samui, Assistant Professor, Presidency University, Kolkata. Duration: January 2019 − May 2019.

Awards and Fellowships

1. Stood first in M.Sc Physics (**Gold medalist**) (2018-2020) with a GPA of 9.65.
2. Awarded the S.N. Bose Scholarship from Indo-US Science and Technology Forum (IUSSTF), 2019 for participating in short-term research at University of California, Santa Cruz (This prestigious scholarship provides an opportunity to selected Indian students to experience short term research work in world-class research facilities in leading U.S. institutions).
3. Stood first in B.Sc Physics (**Gold medalist**) (2015-2018) with a CGPA(MAJOR) of 9.21.
4. Pre-PhD selection at Inter University Centre for Astronomy and Astrophysics (IUCAA) and National Center for Radio Astrophysics (NCRA), 2018.
5. INSPIRE fellow, Department of Science and Technology, Government of India. (Awarded to top 1% of students at their higher secondary (+2) level, who are pursuing bachelors degrees in basic sciences), 2015.
6. Jagadis Bose National Science Talent Search scholar. (This prestigious scholarship is awarded to promising science students after going through a creative and rigorous three stage exam), 2015.
7. Offered Integrated-PhD position in Physics at Indian Institute of Science (IISc), Bangalore, 2018. (Declined)
8. Offered Integrated-PhD position in Physics at Indian Institute of Technology, Kharagpur (IIT), 2018. (Declined)
9. Received the **Makhan Lal Sarkar Memorial Fund (2019)** from Presidency University for standing first in B.Sc, Physics.
10. Awarded the **Priyada Ranjan Ray Memorial Book Prize, 2019** for standing first amongst undergraduates from Physics and the Chemistry department.
11. **Satyabrata Ghosh Cash Prize**,awarded by the Presidency University Alumni Association for standing first in B.Sc freshman and sophomore year, Physics.
12. **Mohindranath Saha memorial prize, 2018**, for standing first in B.Sc freshman and sophomore year, Physics.
13. **Jayanta Bijoy De Memorial scholarship, 2018** , for standing first in B.Sc sophomore year, Physics.
14. Awarded the Best Academic Student award by Kendriya Vidyalaya No-2, Salt Lake for performance in CBSE, Higher Secondary Examination, 2015.
15. Awarded Certificate of Achievement for Excellence in Developing Critical Thinking through Participation in the Thinkquest International Competition, 2011.

Mentoring and Teaching Experience

1. Taught one lecture on 'Imaging the shadow of a black hole' as an invited speaker in the Gened Space, time & Universe course (December, 2019)
2. Taught one lecture on 'Cosmic lighthouses: Cosmology with standard Candles' as a part of peer-teaching in the MSc Cosmology & General Relativity course (November, 2019).
3. Primary mentor for high school students- Riya Shrivastava, Jin Tuan and Gautam Chawla in the **Science Internship Program (2019)** for the project ' Photometrically Variable stars in the Andromeda galaxy ' (Summer 2019).
4. Taught one lecture on 'Numerical and Computational Methods for Solving Ordinary Differential Equations' as part of peer-teaching in the MSc computational physics course (Spring 2019).
5. Taught one lecture on ' Saha Ionization Equation' as part of peer-teaching in the BSc Introduction to Astrophysics course (Spring 2018).

Professional Activities

1. Member, Scientific Organizing Committee, Undergraduate Physics Symposium, Presidency University (Summer 2018).
2. Member, Scientific Organizing Committee, Undergraduate Physics Symposium, Presidency University (Summer 2019).

References

1. Prof. Jonathan Fortney, Professor, Astronomy and Astrophysics, University of California, Santa Cruz.
   Email: jfortney@ucsc.edu
2. Prof. Rebecca JensenClem, Assistant Professor, Astronomy and Astrophysics, University of California, Santa Cruz.
   Email: rjensenc@ucsc.edu
3. Dr. Natasha Batalha, Research Space Scientist, NASA Ames Research Center.
   Email: natasha.e.batalha@nasa.gov
4. Prof. Suchetana Chatterjee, Assistant Professor, Department of Physics, Presidency University.
   Email: suchetana.physics@presiuniv.ac.in
5. Prof. Ritaban Chatterjee, Assistant Professor, Department of Physics, Presidency University.
   Email: ritaban.physics@presiuniv.ac.in
6. Prof. Puragra Guhathakurta, Professor, Department of Astronomy, University of California, Santa Cruz.
   Email: raja@ucolick.org

Coursework Completed

Undergraduate courses

For details about the following courses, please visit the undergraduate syllabus page of Presidency University website.

1. Mathematical Methods I (Textbook: Riley, Hobson and Bence; Mary L. Boas)
2. Classical Mechanics I and Special Relativity (Textbook: Kleppner and Kolenkow; John Taylor; David Morin; Robert Resnick)
3. Thermal Physics (Textbook: Zemansky and Dittman; Daniel Schroeder; Blundell and Blundell)
4. Electromagnetism I (Textbook: David J. Griffiths)
5. Optics (Textbook: Eugene Hecht)
6. Mathematical Methods II and Classical Mechanics II (Textbook: Riley, Hobson and Bence; Mary L. Boas; David Morin; John Taylor)
7. Quantum Mechanics I & Atmoic and Molecular Physics (Textbook: David J. Griffiths; Eisberg and Resnick; Arthur Beiser)
8. Quantum Mechanics II and Electromagnetism II (Textbook: David J. Griffiths (Quantum Mechanics book); David J. Griffiths (Electromagnetism book))
9. Electronics (Textbook: Boylestead, Nashelski)
10. Statistical Physics and Continuum Mechanics (Textbook: Daniel Schroeder; John Taylor; Landau and Lifshitz)
11. Numerical Methods and Computing (Textbook: Numerical Recipes, Press et al.)
12. Nuclear and Particle Physics (Textbook: Eisberg and Resnick)
13. Solid State Physics (Textbook: Ashcroft and Mermin; Kittel)
14. Introduction to Astrophysics (Textbook: Dan Maoz; Carroll and Ostlie; Barbara Ryden (Cosmology book))

Also completed a total of 30 credit general physics lab.

Masters courses

For details about the following courses, please visit the postgraduate syllabus page of Presidency University website.

1. Mathematical Methods (Textbook: Arfken, Weber and Harris)
2. Classical Mechanics: Particles and Fields (Textbook: Herbert Goldstein; Lewis Ryder; Sean M. Carroll)
3. Quantum Physics I (Textbook: Ramamurthy Shankar; Sakurai; P.A.M. Dirac; Gordon Baym)
4. Statistical Mechanics (Textbook: R.K. Pathria; Daniel V. Schroeder)
5. Electrodynamics (Textbook: J.D. Jackson; Julian Schwinger; David J. Griffiths)
6. Condensed Matter Physics (Textbook: Ashcroft and Mermin; Kittel)

7. Computational Techniques (Textbook: Numerical Recipes, Press et al.; Computational Physics, Mark Newman)
8. Quantum Physics II (Textbook: Landau & Lifshitz; David J. Griffith)
9. Introduction to Astrophysics (Textbook: Carroll & Ostlie)
10. Cosmology & General Relativity (Textbook: Kolb and Turner; Barbara Ryden; Jim Hartle; Steven Weinberg)
11. Atomic & Molecular Physics (Textbook: David J. Griffiths)

Also completed a total of 12 credit general physics lab.

Graduate courses

1. Astrophysical Fluid Dynamics
2. Statistical Techniques in Astronomy
3. Teaching Methodology

Co-Curricular Activities

1. Tabla (Indian Percussion instrument) Player, Participated in three KVS National Social Science exhibition in group song competition, Awarded the first prize in 2010 and 3rd prize in 2008.
2. Acted in 13 plays at Various Programmes and Occasions.
3. Boys Scout and guides participant.
4. Participant in many formal debate sessions including Model United Nations at Jadavpur University, 2017.