Koushik Sen **Professional website - ORCiD ID - Facebook**

CONTACT INFORMATION
Steward Observatory, 933 N Cherry Ave, Tucson, AZ 85719 +1 520 738 2300
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RESEARCH INTERESTS
Massive binary and stellar evolution: stellar winds, internal mixing processes, tides, X-ray binaries, stripped-envelope supernovae, gravitational wave progenitors

EMPLOYMENT

University of Arizona, Tucson, USA Jan 2025 - present

Research associate, Department of Astronomy, Steward Observatory

Nicolaus Copernicus University in Torun, Poland Nov 2022 - Dec 2024

Research adjunct, Faculty of Physics, Astronomy and Informatics

EDUCATION

Argelander Institute for Astronomy, Bonn, Germany

Ph.D. in Natural Sciences, Astronomy and Astrophysics, September 27 2022

- Grade: 1.3/4.0 (1.0 - highest, 4.0 - lowest, in steps of 0.3)
- Thesis: *Evolution of short-period massive binaries in the Magellanic Clouds*
- Advisor: Prof. Dr. Norbert Langer

Indian Institute of Technology, Kharagpur, West Bengal, India

Integrated Bachelors and Masters in Science, Physics, July 2018

- GPA: 9.65/10, Institute Silver Medalist
- Masters thesis: *Modelling and evolution of supernova remnants*
- Advisor: Prof. Somnath Bharadwaj

Sri Aurobindo Institute of Education, Kolkata, India

High School, I.S.C., Mathematics, Physics, Chemistry and English, June 2013

- Percentage marks: 95.25%
- IIT JEE: All India Rank: 4958.

STANDARD TESTS

- **GRE** *General*: Score - 332/340; *Physics*: Score - 980/990; Dec 2017

RESEARCH EXPERIENCE - UNDERGRADUATE

Topic: **Laser transmission through fibre at low wavelength (UV) range**
Laser Spectroscopy Group, May 2018 to July 2018
Max Planck Institute for Quantum Optics, Garching, Germany
Supervisor: Prof Dr Thomas Udem; in the group of Prof Dr T. W. Haensch

Topic: **Short-term variability in magnetized massive stars: contribution from unstable magnetosonic waves.**
Astronomy and Astrophysics Division, May 2017 to July 2017
University of Alberta, Edmonton, Canada
Supervisor: Rodrigo Fernandez, Associate Professor

Topic: **The cooling zones of shocks in the winds of massive stars.**
Astronomy and Astrophysics Division, May 2016 to July 2016
University Observatory Munich, Ludwig Maximilian University, Munich, Germany
Supervisor: Joachim Puls, Professor

Topic: **Encoding information in the phases of qubits.**
Physical Sciences Division, December 2014, May 2015 to July 2015
Indian Institute of Science, Education and Research, Kolkata, Kalyani, India
Supervisor: Prof Dr Prasanta K. Panigrahi, Professor

Topic: **Chaotic Oscillations of a current carrying coil in a magnetic field.**
Plasma Physics Division, May 2014 to July 2014
Saha Institute of Nuclear Physics, Kolkata, India
Supervisor: A. N. Sekar Iyengar, Emeritus Professor

Publications

First-authored publications here **and** all publications here

Awards

Travel Grants - International

- IAU Travel Grant - IAU General Assembly, Cape Town, SA 2024
- AG Travel Grant - German Astronomical Society, Germany 2022
- APS Distinguished Student (DS) Program 2018
- University of Alberta Research Experience (UARE) Scholarship, Canada 2017
- DAAD WISE Scholarship, Germany 2016

Graduation - IIT Kharagpur 2018

- Institute Silver Medal, H.N. Bose Memorial Award, G.B. Mitra Award
- Nilanjan Ganguly Memorial Award, Kedarnath Singh Memorial Award

Undergraduate National Fellowships - India

- National Initiative on Undergraduate Sciences (NIUS) Fellow 2013-2014
- Inspire Fellow, Dept. of Science and Technology, India 2013-2018

Competitive telescope time

European Space Agency (ESA), XMM-Newton 2025

- EPIC pn, Prop. Nr. 096343, AO24, total observing time: 54 ks

European Southern Observatory (ESO), Very Large Telescope (VLT) 2024

- UVES, Program ID: 114.27G8, P114, total observing time: 10 hrs

Presentations

Seminar talks - slides here

- Astronomical Observatory of the Jagiellonian University, Krakow - "The renaissance of Algol binaries" weekly seminar - April 12, 2024
- Inter-University Centre for Astronomy and Astrophysics - "Massive Algols as whetstones for binary star evolution towards GW sources." Weekly seminar of the Institute - October 26, 2023
- Tata Institute for Fundamental Research - "Observable properties of massive interacting binaries on the main sequence." Weekly seminar of the Department of Astronomy and Astrophysics - October 10, 2023
- Indian Institute of Technology, Kharagpur - "Observable properties of massive Algol binaries." Department of Physics - October 3, 2023
- Jageillonian University, Kraków - "Evolution of short-period massive binary stars in the Magellanic Clouds." Astrophysics seminar of the Faculty of Physics, Astronomy and Applied Computer Science - April 5, 2023
- Institute of Astronomy, Nicolaus Copernicus University, Torún - "Evolution of short-period massive binary stars in the Magellanic Clouds." Seminar of the Faculty of Physics, Astronomy and Informatics - October 10, 2022

Conference talks - slides & some videos recordings here

- e-Rosita Meeting: from stars to Cosmology - Garching, MPE, MPG - "Whispering in the dark: X-ray faint BHs around OB stars." Sept 20, 2024
- VFTS Meeting - Madrid, ESA, Spain - "Faint X-ray emission from black holes with OB star companions." Sept 16, 2024
- Galactic and extragalactic X-ray transients, theory and observational perspectives - Warsaw, Poland - "X-ray faint BHs around OB stars." Sept 11, 2024
- MODEST 24 - Warsaw, Poland - "Whispering in the dark: X-ray faint BHs around OB stars." Aug 22, 2024
- IAU General Assembly - Div G: Stars and Stellar Physics - Cape Town - "Observable properties of massive Algols." Aug 12, 2024
- IAU 389 — Gravitational Wave Astrophysics - Cape Town - "Massive Algols as whetstones for the progenitors gravitational wave sources." Aug 6, 2024
- LIAC41: The eventful life of massive star multiples - Liege - "Observable properties of Algol binaries across the Hertzsprung-Russell diagram." July 16, 2024
- 3,2,1: Massive Triples, Binaries and Mergers - KU Leuven - "Observable consequences of interactions in massive main sequence binaries." July 18, 2023

- EAS Annual meeting - Krakow - "Reverse Algols and hydrogen-rich Wolf-Rayet stars from massive binary evolution." July 11, 2023
- The Wolf-Rayet phenomenon in the Universe - Mexico - "Hydrogen-rich Wolf-Rayet stars on the main sequence from massive binaries." June 19, 2023
- AG 2022: "Nuclear-timescale reverse Algol evolution and hydrogen-rich Wolf-Rayet stars from very massive binaries." September 15, 2022
- SuperVirtual-2021 - From Common to Exotic Transients - "Compact object progenitors and their companions on the HR diagram." November 15, 2021
- MPA-NBIA Gravitational Wave Astrophysics Workshop, Garching - "Detailed models of interacting short-period massive binary stars as progenitors of gravitational wave sources." November 9, 2021
- AG 2021: "X-ray emission from BH + O star binaries expected to descend from the observed galactic WR + O binaries." September 15, 2021
- AG 2020: "Case A mass transfer: A comprehensive study of their observable stellar properties." September 24, 2020
- APS April Meeting - "From Quarks to Cosmos": "Variability in winds of magnetic massive stars: effect of unstable magnetosonic modes." April 15, 2018

Teaching Experience

1. **Guest Lecturer**, Graduate astronomy program at the University of Arizona
   - Massive binary star evolution — Current semester 2025
     Instructor: Mathieu Renzo, University of Arizona
2. **Guest Lecturer**, Masters course at the Nicolaus Copernicus University
   - Introduction to binary stars — Summer semester 2024
     Instructor: Dorottya Szecsi, Nicolaus Copernicus University in Torun
3. **Tutor**, Masters courses at the University of Bonn
   - Stellar Nucleosynthesis — Summer semester 2021
     Instructor: Norbert Langer, Argelander Institute for Astronomy
   - Stellar Structure and Evolution — Winter semester 2020
     Instructor: Norbert Langer, Argelander Institute for Astronomy
   - Programming in Python — Summer semester 2020
     Instructor: Thomas Erben, Argelander Institute for Astronomy

References

1. Prof Dr Norbert Langer - Ph.D. supervisor - Argelander Institute for Astronomy, University of Bonn - email: nlanger@astro.uni-bonn.de
2. Prof Dr Hugues Sana - collaborator - KU Leuven - email: hugues.sana@kuleuven.be
3. Prof Dr Dorottya Szecsi - postdoctoral supervisor - Institute of Astronomy, Nicolaus Copernicus University in Torun - email: dorottya@umk.pl
4. Prof Dr Mathieu Renzo - postdoctoral supervisor - Steward Observatory, University of Arizona - email: mrenzo@arizona.edu