Dr. Koushik Sen **Personal website**

CONTACT INFORMATION
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RESEARCH INTERESTS
Stellar Astrophysics: Massive binary and stellar evolution, internal mixing processes, stellar winds, radiation magneto-hydrodynamics, star cluster evolution
High Energy Astrophysics: high mass X-ray binaries, compact object binaries, gravitational waves, stripped-envelope supernovae, supernova remnants

EDUCATION

Argelander Institute for Astronomy, Bonn, Germany

Ph.D., Astronomy and Astrophysics, September 27 2022

- Grade: *Magna cum Laude*
- Thesis Topic: *Evolution of short-period massive binaries in the Magellanic Clouds*
- Advisor: Prof. Dr. Norbert Langer

Indian Institute of Technology, Kharagpur, West Bengal, India

B.Sc. and M.Sc., Physics, July 2018

- GPA: 9.65/10
- Masters thesis Topic: *Modelling and evolution of supernova remnants*
- Advisor: Prof. Somnath Bharadwaj, Head of Center for Theoretical Studies.

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.

STANDARDISED TESTS

- **GRE General**: Score - 332/340; Year - 2017
- **GRE Physics**: Score - 980/990; Year - 2017
- **TOEFL iBT**: Score - 108/120; Year -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: Thomas Udem; in the group of Prof. 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, Assistant 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: Prasanta K. Panigrahi, Director

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, Senior Professor

Awards

Travel Grants - International

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

Undergraduate National Fellowships - India

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

Presentations

Invited talks

- 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

Contributed talks

- 3,2,1: Massive Triples, Binaries and Mergers - KU Leuven - "Observable consequences of interactions in massive main sequence binaries." July 18, 2023
- Annual meeting of the European Astronomical Society - 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 - "Variability in the winds from magnetized massive stars: effect of unstable magnetosonic modes." April 15, 2018

Teaching Experience

1. Tutor, Masters courses in 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