

# Estuti Shukla

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## EDUCATION

### IISER KOLKATA

2016-2021 | Kolkata, India

### BS-MS DUAL DEGREE

Indian Institute of Science

Education and Research

Masters in Physics

Cum. GPA: 8.74 / 10.0

Major GPA: 9.03 / 10.0

### SARDAR PATEL VIDYALAYA

Grad. May 2016 | Delhi, India

### SENIOR SECONDARY EXAMINATION XII<sup>TH</sup> (CBSE)

Percentage- 95 %

## RESEARCH INTERESTS

General Relativity,  
Gravitational Physics,  
Numerical Relativity, Cosmology

## SKILLS

### PROGRAMMING

Advanced

- Python
- $\text{\LaTeX}$  • C/C++

Intermediate

- Mathematica • R • MATLAB

Familiar:

- HTML

### OPERATING SYSTEMS

- GNU/Linux • Windows

### OTHERS

- Git/GitHub • GNUplot • Origin

## COURSEWORK

Advanced Statistical Mechanics,  
Research Methodology,  
High Energy Physics,  
General Relativity,  
Condensed Matter Physics,  
Quantum Field Theory,  
Non-linear Dynamics,  
Electrodynamics, Optics  
Thermodynamics,  
Classical Mechanics,  
Astrophysics,  
Computational Physics,  
Data Structures & Algorithms,  
Space Astronomy, Linear Algebra

## WORK EXPERIENCE

### ICTS-TIFR BANGALORE | VISITING STUDENT RESEARCHER

September 2021 - Present | Prof. Prayush Kumar | Bangalore

- Project Description- Studying the properties of dynamical horizons using numerical relativity simulations (SpEC code).

### IIT MADRAS | RESEARCH INTERN

June 2021 - Present | Prof. Chandra Kant Mishra | Remote

- Project Description- SNR analysis of IMRIs for the proposed space-based detector DECIGO. This work is being written into a publication.

### IISER KOLKATA | MASTER'S THESIS

July 2020 - July 2021 | Prof. Rajesh Kumble Nayak | Kolkata, India

- Thesis Title- Static Stars in Cosmological Backgrounds
- Project Description- Studies model of stars in Einstein and de Sitter universe using TOV equations modified as per the background universe. We looked at various mass-radius relationships and searched for the possibility of black hole mimickers.

### JOHNS HOPKINS | RESEARCH INTERN

Oct 2020 - Present | Prof. Emanuele Berti | Remote

- Project Description- Studied non-linearities associated with 'first-order' quasinormal modes in binary black holes mergers. This work is being written into a publication.

### UMASS DARTMOUTH | SUMMER RESEARCH INTERN

Jun 2020 - Sep 2020 | Prof. Gaurav Khanna and Prof. Scott Field | Remote

- Project Description- I added functionalities such as remnant Bondi mass and kick velocity to the EMRI surrogate model developed by the gravity group at UMassD. I was added as a contributor to the open-source model. (Link)

### IISER KOLKATA | INDEPENDENT STUDY

July 2020 - Dec 2020 | Prof. Dibyendu Nandi | Kolkata, India

- Study Description- Studied the fundamentals of magneto-hydrodynamics, fluids and plasma.

### IUCAA PUNE | WORKSHOP AND HACKATHON

Dec 2019 - March 2020 | LIGO India | Pune, India

- Workshop and Hackathon Description- My two-person team won the FINESSE (Frequency domain Interferometer Simulation Software) hackathon conducted by LIGO India and University of Glasgow. After being selected for a three months mentorship workshop for designing gravitational wave detectors, we competed to improvise a design of the interferometer.

### IISER MOHALI | SUMMER RESEARCH INTERN

May 2019 - July 2019 | Prof. Jasjeet Singh Bagla | Mohali, India

- Project Description- Learnt ray tracing method to simulate "image" of black hole and null geodesics in Schwarzschild metric.

### IIT INDORE | SUMMER RESEARCH INTERN

May 2018 - July 2018 | Dr. Bhargav Vaidya | Indore, India

- Project Description- Studied shock waves in MHD framework. Learnt about Rankine Hugoniot conditions and simulated shock waves in python.

## LANGUAGES

English, Hindi

## TEST SCORES

### TOEFL- 113/120

- Reading- 26/30
- Listening- 29/30
- Speaking- 30/30
- Writing- 28/30

## OTHER INTERESTS

Long distance running,  
Playing Ukulele,  
Trekking,  
Public speaking,  
Playing badminton,  
Theater

## TEACHING EXPERIENCE

### IISER KOLKATA | TEACHING ASSISTANT

Jan 2021 - May 2021 | General Theory of Relativity & Cosmology | Kolkata

- Teaching assistant for PH4205 General Relativity course under the guidance of Prof. Rajesh Nayak.

### IISER KOLKATA | TEACHING ASSISTANT

July 2020 - Dec 2020 | Intermediate Quantum Mechanics | Kolkata

- Teaching assistant for PH3102 Quantum Mechanics course under the guidance of Prof. Soumitro Banerjee.

## PUBLICATIONS

- [1] E. Shukla, V. Baibhav, E. Berti, V. Cardoso, T. Helfer, U. Sperhake, and K. Wong.  
Hunting new modes before the merger (**in preparation**).

## TALKS/PRESENTATION

- 3<sup>rd</sup> Sep'20      Talk on computing remnant mass of binary black hole mergers using EMRI surrogate model at UMass Dartmouth's physics colloquium series.
- 11<sup>th</sup> Mar'20      Group presentation on probing neutron stars merger with LIGO interferometer for FINESSE Hackthon at IUCAA Pune.

## SEMINARS/WORKSHOPS/CONFERENCES

- July'21      ICTS Summer School on Gravitational- Wave Astronomy, ICTS-TIFR Bangalore (Virtual)
- Sep-Dec'20      Semester Program on Advances in Computational Relativity by ICERM, Brown University (Virtual)
- Sep'20      Vienna Summer School on Gravitational Quantum Physics by University of Vienna(Virtual)
- Aug'20      North American Einstein Toolkit Workshop by LSU (Virtual)
- May'20      BHP Toolkit Spring Workshop 2020 (Virtual)
- May'20      Gravitational Wave Summer School on Numerical Relativity by ICTS-TIFR Bangalore (Virtual)
- Nov'19      Data Science in Astrophysics GW research at IIIT Allahabad
- Oct'19      Bootcamp by NVIDIA on High-performance computing at IISERK
- Nov'16      National Science (Vijyoshi) Camp by DST, Gov. of India at IISERK

## AWARDS AND RECOGNITION

- 2021      One out of 7 people selected for the prestigious LTVSP program (ICTS)
- 2020      Won FINESSE Hackathon and was supposed to be hosted as an intern in a GW institution in Europe (cancelled due to pandemic)
- 2016      DST Inspire Scholarship by Govt. of India
- 2016      Top 1 % in CBSE Board Class XII<sup>th</sup> Examination in India

## EXTRA CURRICULAR

- 2020-21      Established IKQRAAR, the official LGBTQ+ support platform at IISERK
- 2019-20      Founder and Secretary of Trekking and Adventure Club, IISERK
- 2019-20      Founding Member and Coordinator of Student Alumni Cell, IISERK
- 2018-19      Secretary of Aarshi, Dramatics Club, IISERK
- Dec'18      Event Organiser at 1st Inter-IISER Cultural Meet (IICM)'18
- 2017-18      Sponsorship Head, Core Committee, Inquiesta, college fest of IISERK