

# Krishna Jalan

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## Research Interests

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- Quantum information aspects of quantum field theory and quantum gravity;
- Black hole information paradox;
- Gauge/gravity duality.

## Education

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SEP 2020 – ....

### Ph.D. in Theoretical Physics

The Institute of Mathematical Sciences, Chennai

Thesis : Black Hole Dynamics & Holography

Supervisor : [Roji Pius](#)

AUG 2014 – MAY 2019

### (Integrated) M.Sc. in Physics

National Institute of Technology, Rourkela

Thesis : Anisotropic Thermalization in Strongly Coupled Field Theory via Gauge/Gravity Duality

Supervisor : [Subhash Chandra Mahapatra](#)

## Work Experience

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SEP 2019 – DEC 2019

### Research Assistant

Gauhati University, Guwahati

Project on early universe dynamics related to inflation theory and origin of density perturbations, and dynamical dark energy under the guidance of *Dr. Sanjeev Kalita*.

AUG 2018 – MAY 2019

### Master's Student

National Institute of Technology, Rourkela

Master's thesis project on the application of gauge/gravity duality to study anisotropic signature of magnetic field on the thermalization time of quark-gluon plasma.

MAY 2018 – JUL 2018

### Summer Research Fellow

Harish-Chandra Research Institute, Prayagraj (Allahabad)

Project on dark matter particles titled *A Study of Dark Matter* under the guidance of *Prof. Biswarup Mukhopadhyaya*.

MAY 2017 – JUL 2017

### Summer Research Fellow

Jawaharlal Nehru University, Delhi

Project on neutrino oscillations titled *Phenomenology of Neutrino Oscillation* under the guidance of *Dr. Poonam Mehta*.

## Publications

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### Published

1. Prateksh Dhivakar and **Krishna Jalan**. *Generalized second law for non-minimally coupled matter theories*. *Class. Quant. Grav.*, 41(15):155003, 2024. [[2309.12782](#)]

## Under Review/Preprint

2. **Krishna Jalan**, Roji Pius, and Manish Ramchander. *Half-sided Translations and the Information Recovery from Radiation*, 2023, [2312.11085].
1. **Krishna Jalan** and Roji Pius. *Half-sided Translations and Islands*, 2023, [2312.11085].

## **Presentations**

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### Invited Talks

- **Half-sided Translations and Islands**

- *Chennai Strings Meeting*, jointly organized by CMI-IMSc-IIT Madras, India November 2023

### Poster Presentation

- **Generalized second law for non-minimally coupled matter theories**

- *Quantum Information, Quantum Field Theory, and Gravity Workshop*, International Centre for Theoretical Sciences, Bengaluru, India August 2024
- *3rd Quantum Field Theory in Curved Spacetimes Workshop*, Instituto Superior Técnico, Lisbon, Portugal (awarded a sum of 1500 Euros courtesy of the **Julian Schwinger Foundation for Physics Research** to support my travel and accommodation) June 2024

- **Half-sided Translations and Islands**

- *Indian Strings Meeting 2023*, IIT Bombay, Mumbai, India December 2023

### Informal Talks

- **Generalized second law for non-minimally coupled matter theories,**

- *Department Seminar*, Indian Institute of Technology, Kanpur September 2024

- **Introduction to Covariant Phase Space: the Geometry of “Geometry”**, Chennai Mathematical Institute, India, February 2024.

- **Black Hole Interiors and Modular Inclusions**, The Institute of Mathematical Sciences, Chennai, India, May, 2023.

- **Algebras and Emergent “Times”**, The Institute of Mathematical Sciences, Chennai, India, May 2022.

## **Conferences/Workshops**

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Excluding the ones where I have given/presented a talk/poster.

- *1st Advanced Lectures in Physics in Switzerland*, Les Diablerets, Switzerland, May 2024. Partially funded by the sponsors – SwissMAP and Quantinuum.
- *Young Researchers’ Gravity Meeting*, Chennai Mathematical Institute, India, September 2023.
- *Observable Algebras in Field Theory and Gravity, JulyPhy Workshop*, IIT Mandi, India, July 2023.
- *Student Talks on Trending Topics in Theory (ST4 2023) Workshop*, IIT Mandi, India, July 2023.
- *Black Holes and Gauge Theories with Holographic Enlightenment*, IIT Madras, Chennai, India, January 2023.

- *Non-perturbative and Numerical Approaches to Quantum Gravity, String Theory, and Holography*, ICTS-TIFR, Bengaluru, India, August-September 2022.
- *Quantum Field Theory in Curved Spacetimes Workshop*, Online Conference, Spain, May 2022.
- *Indian Strings Meeting 2021*, Online Conference, IIT Roorkee, India, December 2021.
- *All Lambdas Holography @ Prague*, Online Conference, Czechia, October 2021.
- *Black Holes Inside and Out*, Online Conference, Japan, September 2021.
- *Workshop on Astronomy & Astrophysics*, NIT Rourkela, India, sponsored by Inter-University Center for Astronomy & Astrophysics, Pune, India, March 2018.
- *Workshop on General Relativity & Cosmology*, Department of Physics & Astronomy, NIT Rourkela, India, February 2018.
- *Mathematics Training and Talent Search program (Level O)*, Shiv Nadar University, Noida, India, June 2016.

## Awards & Achievements

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- ◇ Qualified for the prestigious [INSPIRE Fellowship](#) awarded by Department of Science and Technology, Government of India, for the year 2020, for carrying out doctoral degree in both basic and applied sciences. (*did not avail*)
- ◇ Qualified the following national level entrance tests for **Junior Research Fellowship** eligibility – **UGC-CSIR National Eligibility Test**, **Graduate Aptitude Test in Engineering (Physics)**, and **Joint Entrance Screening Test**, 2020.
- ◇ Institute Gold Medal for the Best Postgraduate with Integrated M.Sc. Degree among the natural sciences, National Institute of Technology, Rourkela, awarded in January, 2020.
- ◇ Institute Silver Medal for the Best Postgraduate with Integrated M.Sc. Degree in Department of Physics & Astronomy, National Institute of Technology, Rourkela awarded in January, 2020.
- ◇ Selected for the prestigious *Summer Research Fellowship*, awarded jointly by the academies of sciences in India (IASc-INSa-NASI), for 2 consecutive years, May - July, 2017 and 2018.
- ◇ Recipient of Academic Excellency Award, Department of Physics and Astronomy, NIT Rourkela, for 4 consecutive academic years, 2014-15, 2015-16, 2016-17 and 2017-18.
- ◇ [INSPIRE Scholarship](#) awarded by Department of Science and Technology, Government of India, to the top 1 percentile students of the country based on Higher Secondary merit, February, 2015 - May, 2019.
- ◇ Qualified **Regional Mathematics Olympiad** from the North Eastern Region of India, 2013.
- ◇ Awarded the "Certificate of Appreciation" for academic excellence in the Matriculation examination, by the Deputy Commissioner, Chirang District, Assam, India, 2012.
- ◇ Gold Medal in Mathematics Olympiad conducted by All India Schools Mathematics Teachers Association, 2011.

## Teaching Experience\*

\* All the courses assisted at The Institute of Mathematical Sciences, Chennai were graduate level courses. The duties involved preparation and grading of assignments and conducting tutorial sessions for a class size of about 5-10 students.

SPRING 2024	<b>Teaching Assistant for Quantum Mechanics II</b> The Institute of Mathematical Sciences, Chennai
FALL 2023	<b>Teaching Assistant for Electromagnetic Theory</b> The Institute of Mathematical Sciences, Chennai
SPRING 2023	<b>Teaching Assistant for Quantum Field Theory II</b> The Institute of Mathematical Sciences, Chennai
FALL 2022	<b>Teaching Assistant for Quantum Mechanics I</b> The Institute of Mathematical Sciences, Chennai
SPRING 2022	<b>Teaching Assistant for General Relativity</b> The Institute of Mathematical Sciences, Chennai
OCT 2022	Taught an online problem solving session to a group of 15 students preparing for the <b>Indian Olympiad Qualifier in Mathematics</b> during a training camp organized by the <i>Assam Academy of Mathematics, Bongaigaon Branch, Assam</i> .
AUG 2017 - APR 2018	<b>Tutor at Student Counselling Program</b> National Institute of Technology, Rourkela Taught a class of about 20 students – Freshmen Physics Remedial Class.

## Skills

TECHNICAL	<ul style="list-style-type: none"><li>◇ OS — Linux, Windows.</li><li>◇ CODING — C (basic), C++ (basic), FORTRAN (intermediate), Python (intermediate), Mathematica (intermediate), Maxima (basic).</li><li>◇ DOCUMENTATION — <math>\text{\LaTeX}</math> (advanced), Office (advanced).</li></ul>
LANGUAGES	Marwadi (mother tongue), Hindi (fluent), English (fluent), Assamese (basic), Bengali (basic), Japanese (basic, spoken).

## Non-academic Duties

FEB 2023	<b>Organizer of the Freshers' event</b> The Institute of Mathematical Sciences, Chennai Organized the Freshers' event to welcome the new members of the institute.
AUG 2017 – APR 2018	<b>Mentor at Student Counselling Program</b> National Institute of Technology, Rourkela Academic and non-academic guide to a group of 4 freshmen.
APR 2011 – FEB 2012	School Head-boy during high school.

## References

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Dr. Roji Pius  
Department of Theoretical Physics  
The Institute of Mathematical Sciences, Chennai

Dr. Subhash Chandra Mahapatra  
Department of Physics & Astronomy  
National Institute of Technology, Rourkela

Email address available upon request.