

Krishna Jalan

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Research Interests

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

Education

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

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

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, [\[2312.11085\]](#).

Conferences/Workshops

Invited Talks

1. *Half-sided Translations and Islands*. Chennai Strings Meeting 2023, jointly organized by CMI-IMSc-IIT Madras, India, November 2023.

Poster Presentation

1. *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.
2. *Generalized second law for non-minimally coupled matter theories*. *3rd Quantum Field Theory in Curved Spacetimes Workshop*, Instituto Superior Técnico, Lisbon, Portugal, June 2024. (Awarded a sum of 1500 Euros courtesy of the *Julian Schwinger Foundation for Physics Research* to support my travel and lodging).
3. *Half-sided Translations and Islands*. *Indian Strings Meeting 2023*, IIT Bombay, Mumbai, India, December 2023.

Informal Talks

1. *Introduction to Covariant Phase Space: the Geometry of “Geometry”*, Chennai Mathematical Institute, India, February 2024.
2. *Black Hole Interiors and Modular Inclusions*, The Institute of Mathematical Sciences, Chennai, India, May, 2023.
3. *Algebras and Emergent “Times”*, The Institute of Mathematical Sciences, Chennai, India, May 2022.

Attended*

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

1. *1st Advanced Lectures in Physics in Switzerland*, Les Diablerets, Switzerland, May 2024. Partially funded by the sponsors – SwissMAP and Quantinuum.
2. *Young Researchers’ Gravity Meeting*, Chennai Mathematical Institute, India, September 2023.
3. *Observable Algebras in Field Theory and Gravity, JulyPhy Workshop*, IIT Mandi, India, July 2023.
4. *Student Talks on Trending Topics in Theory (ST4 2023) Workshop*, IIT Mandi, India, July 2023.
5. *Black Holes and Gauge Theories with Holographic Enlightenment*, IIT Madras, Chennai, India, January 2023.
6. *Non-perturbative and Numerical Approaches to Quantum Gravity, String Theory, and Holography*, ICTS-TIFR, Bengaluru, India, August-September 2022.
7. *Quantum Field Theory in Curved Spacetimes Workshop*, Online Conference, Spain, May 2022.
8. *Indian Strings Meeting 2021*, Online Conference, IIT Roorkee, India, December 2021.
9. *All Lambdas Holography @ Prague*, Online Conference, Czechia, October 2021.
10. *Black Holes Inside and Out*, Online Conference, Japan, September 2021.

11. *Workshop on Astronomy & Astrophysics*, NIT Rourkela, India, sponsored by Inter-University Center for Astronomy & Astrophysics, Pune, India, March 2018.
12. *Workshop on General Relativity & Cosmology*, Department of Physics & Astronomy, NIT Rourkela, India, February 2018.
13. *Mathematics Training and Talent Search program (Level O)*, Shiv Nadar University, Noida, India, June 2016.

Awards & Achievements

- ◇ 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	Teaching Assistant for Quantum Mechanics II The Institute of Mathematical Sciences, Chennai
FALL 2023	Teaching Assistant for Electromagnetic Theory The Institute of Mathematical Sciences, Chennai
SPRING 2023	Teaching Assistant for Quantum Field Theory II The Institute of Mathematical Sciences, Chennai

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

Skills

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

Non-academic Duties

FEB 2023	Organizer of the Freshers' event The Institute of Mathematical Sciences, Chennai Organized the Freshers' event to welcome the new members of the institute.
AUG 2017 – APR 2018	Mentor at Student Counselling Program 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

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
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Email address available upon request.