
Dr. Rahul Somasundaram

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Work Experience

Syracuse University, United States - *Post-Doctoral Research Associate*

October 2022 - Present

- Postdoctoral position affiliated with the Nuclear Physics from Multi-Messenger Mergers (NP3M) collaboration

Los Alamos National Laboratory, United States - *Visiting Postdoctoral Research Associate*, October 2022 - Present

Institut de Physique des 2 Infinis de Lyon, France - *PhD*

October 2019 - September 2022

- Thesis title: Modeling of Isolated and Coalescing Neutron Stars
- Supervisors: Dr. Jérôme Margueron and Dr. Hubert Hansen

Grand Accélérateur National d'Ions Lourds (GANIL), France - *Research Internship*

August 2018 - January 2019

- Internship title: A solvable nuclear model with pairing and aligned interactions
- Supervisor: Dr. Pieter Van Isacker

Legnaro National Laboratory (LNL), Italy - *Research Internship*

February 2018 - July 2018

- Internship title: Measurement of sub-barrier heavy-ion fusion cross section
- Supervisors: Dr. Giovanna Montagnoli and Dr. Alberto Stefanini

Saha Institute of Nuclear Physics, India - *Undergraduate Research Associate*

May 2016 - July 2016

- Summer Project title: Zeroth order Nuclear Shell model calculations
- Supervisor: Dr. Maitreyee Saha Sarkar

Education

University of Barcelona, Spain - *Master's thesis (Fourth Semester)*

February 2019 - July 2019

- Master's thesis title: Exotic Hadrons in the $\Lambda_b \rightarrow J/\psi \Phi \Lambda$ decay

- Supervisors: Dr. Àngels Ramos and Dr. Volodymyr Magas
- Grade: 10/10 (highest qualification)
- International Joint Masters degree in Nuclear Physics awarded by the University of Seville in September, 2019 for having completed 1 semester in Barcelona, 1 semester in France (see below) and 2 semesters in Italy (see below)

University of Caen, France - *Master's program (Third Semester)*

August 2018 - January 2019

- Grade: 17.59/20 (very good)
- Diploma title: Master de Physique

University of Padova, Italy - *Master's program (First and Second Semesters)*

September 2017 - July 2018

- Grade: 29.4/30
- Diploma title: Laurea Magistrale in Fisica

St. Stephen's College (University of Delhi), India - *Bachelors in Physics*

July 2014 - May 2017

- Final Grade: 91.5 % (1st division)
- Bachelor of Science (Honors) - Physics awarded in August, 2017

Awards and Grants

- Doctoral grant from the PHAST doctoral school (ED 52)
Award Significance: Every year, the PHAST doctoral school accepts applications from 8 laboratories in the Lyon region of France for one or two doctoral 'attractiveness contracts' meant for very few exceptional students. I was awarded this grant for the period October, 2019 to October, 2022.
- Awarded the title 'Most outstanding postgraduate student' by the University of Seville
Award Significance: I was part of an international group of highly talented students enrolled in an Erasmus Joint Masters program. Among all 20 students, I graduated with the best academic record and was officially recognized for this achievement.
- Held the competitive Erasmus Mundus Joint Masters scholarship funded by the European Union from September, 2017 to September, 2019
Award Significance: This scholarship is funded by the European Education and Culture Executive Agency (EACEA). I was ranked in the top 20%, among hundreds of applicants, by an international selection committee that awarded this grant. This grant funded my Master's education carried out in three countries: Italy, France, and Spain.
- First position amongst all undergraduate students in the Meera Memorial paper presentation competition held at St. Stephen's College (University of Delhi) in October, 2016

Teaching Activities

- Teaching assistant at Université Lyon 1, Subject: Electricity and Radioactivity (32 hours)
- Teaching assistant at École nationale supérieure d'architecture de Lyon, Subject: Mechanics and Thermodynamics (32 hours)

Supervision of Students

- Co-supervision of Master's student, Mohamad Chamseddine, at the Institut de Physique des 2 Infinis de Lyon.
Project: Relativistic modeling of nuclear matter
- Co-supervisor of Bachelor's student, Alanis Rodriguez-Diaz, at Los Alamos National Laboratory (Student Guest Program).
- Co-supervisor of Post-Bachelor's student, Andrew Deneris, at Los Alamos National Laboratory (Science Undergraduate Laboratory Internships).
- Co-mentor of Graduate student, Tousif Reza, at Los Alamos National Laboratory (LANL-ZTF Summer School).
- Co-mentor of Graduate student, Felipe Fontinele, at Los Alamos National Laboratory (LANL-ZTF Summer School).

Invited Talks

- Event: CeNAM Frontiers Meeting in Nuclear Astrophysics, University of Notre Dame, USA
Presentation Title: Dense matter physics in the multi-messenger era
Date: 3rd June, 2024
- Event: Nuclear, Particle, Astroparticle and Cosmology (NUPAC) Seminars series, University of New Mexico, USA
Presentation Title: The Equation of State of Neutron Stars: Understanding the Densest Objects in the Universe
Date: 10th October, 2023
- Event: NuSym23, XIth International Symposium on Nuclear Symmetry Energy, Darmstadt, Germany
Presentation Title: Multi-Messenger Astrophysics and the Nuclear Symmetry Energy
Date: 21st September, 2023

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- Event: Information And Statistics in Nuclear Experiment and Theory, St. Louis, USA
Presentation Title: Applications of novel chiral interactions to quantum Monte Carlo methods and astrophysical data analysis
Date: 23rd May, 2023
 - Event: Los Alamos Astrophysics Distinguished Seminar Series, Los Alamos, USA
Presentation Title: Constraining the Equation of State of Dense Matter using Neutron Star Observations
Date: 15th December, 2022
 - Event: Theory Division T-2 seminar series, Los Alamos, USA
Presentation Title: The Equation of State of Dense Neutron Star Matter
Date: 14th December, 2021
 - Event: Invited talk at Indian Institute of Technology, Delhi, India
Presentation Title: Theoretical and experimental advances in the nuclear astrophysics of neutron stars
Date: 1st October, 2021

Other talks

- Event: Institute for Nuclear Theory Workshop: EOS Measurements with Next-Generation GW Detectors, Seattle, USA
Presentation Title: Inferring chiral three-nucleon forces from third-generation gravitational-wave detectors
Date: 30th August, 2024
- Event: Institute for Nuclear Theory Workshop: Inverse Problems and Uncertainty Quantification in Nuclear Physics, Seattle, USA
Presentation Title: Emulators for Inverse Problems in Dense Matter Physics
Date: 10th July, 2024
- Event: Theory Division CNLS seminar series, Los Alamos, USA
Presentation Title: Machine Learning for Data-Driven Nuclear Astrophysics
Date: 13th June, 2024
- Event: Theory Division T-2 seminar series, Los Alamos, USA
Presentation Title: Nuclear astrophysics in the multi-messenger era
Date: 14th March, 2024
- Event: NUCLEI (Nuclear Computational Low-Energy Initiative) collaboration meeting, Knoxville TN, USA
Presentation Title: New chiral interactions for quantum Monte Carlo methods

Date: 24th July, 2023

- Event: Institute for Nuclear Theory Workshop: Neutron Rich Matter on Heaven and Earth, Seattle, USA

Presentation Title: Applications of novel chiral interactions to quantum Monte Carlo methods

Date: 27th June, 2023

- Event: APS April Meeting, Minneapolis, USA

Presentation Title: Constraints on Dense Matter from Neutron Star Observations and Effective Field Theory Calculations

Date: 16th April, 2023

- Event: Nuclear Physics for Multi-Messenger Mergers (NP3M) Collaboration Meeting, Knoxville TN, USA

Presentation Title: Constraints on the Equation of State of Dense Matter from Chiral EFT

Date: 26th January, 2023

- Event: ECT* Workshop: Neutron Stars as Multi-Messenger Laboratories for Dense Matter, Trento, Italy

Presentation Title: Modeling of Phase transitions in Neutron Stars

Date: 21th June, 2022

- Event: Network for Neutrinos, Nuclear Astrophysics and Symmetries (N3AS) Seminar Series, Online

Presentation Title: The Equation of State of Dense Neutron Star Matter

Date: 29th December, 2021

- Event: GdR RESANET Junior Researcher Webinar Series, France

Presentation Title: Constraining the Equation of State of dense matter in neutron stars using multi-messenger observations

Date: 15th November, 2021

- Event: PhD Students' Presentation Series, Lyon France

Presentation Title: The Nature of Phase Transitions in Dense Matter

Date: 26th October, 2021

- Event: Modélisation des Astres Compacts (MAC) workshop, France

Presentation Title: Nuclear symmetry energy from chiral EFT calculations

Date: 5th November, 2020

- Event: XLVII International Meeting On Fundamental Physics (IMFP), Madrid, Spain

Poster Presentation Title: Exotic hadrons in the $\Lambda_b \rightarrow J/\psi \Phi \Lambda$ decay Duration: 3rd June, 2019 - 7th June, 2019

Schools and Training programs

- Program: Bayesian Analysis of Nuclear Dynamics (BAND) Camp
Institute: Washington University in St. Louis, USA
Date: 22nd May, 2023
- Program: Frontiers in Nuclear and Hadronic Physics 2021
Institute: Galileo Galilei Institute (Florence, Italy)
Duration: 1st March, 2021 - 12th March, 2021
- Program: School of Statistics
Institute: Institut national de physique nucléaire et de physique des particules (IN2P3)
Duration: 18th January, 2021 - 29th January 2021
- Program: Frontiers in Nuclear and Hadronic Physics 2020
Institute: Galileo Galilei Institute (Florence, Italy)
Duration: 24th February, 2020 - 6th March, 2020
- Program: Data Analysis and Machine Learning
Institute: Grand Accélérateur National d'Ions Lourds (Caen, France)
Duration : 21st January, 2019 - 31st January, 2019
Course Instructor: Dr. Morten Hjorth-Jensen

Memberships

- Referee for the following journals:
 - The Astrophysical Journal
 - Physics Letters B
 - Physical Review C
 - Physical Review D
- The Cosmic Explorer Consortium (since 2022)
- Research fellow at the Nuclear Physics from Multi-Messenger Mergers (NP3M) Focused Research Hub (since 2022)
- CNRS/IN2P3 NewMAC project (since 2020)
Gravitational Waves Research Group, GdR OG: Groupement de recherche: Ondes Gravitationnelles (since 2019)
- Nuclear Astrophysics Research Group, GdR RESANET: Groupement de recherche: Reactions, Structure et Astrophysique Nucléaire (since 2019)