

Luca Boccioli

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Research Positions

Postdoctoral Researcher	UC Berkeley, CA	09/2023 - present
Affiliate Researcher	Lawrence Berkeley National Lab, CA	01/2024 - present
ORISE Graduate Researcher	Oak Ridge National Lab, TN	09/2019 - 12/2019

Education

Ph.D. in Physics, University of Notre Dame, IN Advisor: Grant J. Mathews; Thesis title: <i>Explodability of Core-Collapse Supernovae: Roles of Neutrino-driven Convection, the Nuclear Equation of State, and the Progenitor Structure</i>	08/2017 - 08/2023
M.A. in Physics, University of Perugia, Italy Advisor: Maurizio M. Busso 110/110 <i>cum laude</i> Thesis title: <i>The solar lithium abundance: a clue to understand weak interactions and hydrodynamical mechanisms in stars</i> Advisor: Maurizio M. Busso	10/2015 - 07/2017
B.S. in Physics, University of Perugia, Italy 110/110 <i>cum laude</i>	10/2012 - 09/2015

Professional Experience

Co-Supervisor of Marco Loddo's "Master's thesis"	La Sapienza, Rome, Italy	2024-2025
Co-Organizer of the "TAC Seminar Series"	UC Berkeley, CA	2024-2025
Co-Organizer of the "2023 CeNAM Frontiers Meeting"	Michigan State University, MI	05/2023
Session Chair at the "2023 CeNAM Frontiers Meeting"	Michigan State University, MI	05/2023
Session Chair at the "Key Reactions in Nuc. Astro."	ECT* - Trento, IT (virtual)	06/2021
Co-Organizer of the "Midwest Relativity Meeting"	University of Notre Dame, IN	10/2020

Grants, Honors & Awards

IReNA Visiting Fellowship	01/2025
Outstanding Graduate Student Teacher Award	03/2022
Winner of 3MT Qualification Round	09/2021
ANPhA & AAPPs-DNP Award for Young Scientists (Best poster at NIC XVI)	09/2021
Graduate Student Union, Conference Presentation Travel Grant	04/2019
Division of Astrophysics Student Travel Grant for the 2019 APS April Meeting	02/2019
Graduate Student Professional Development Award	05/2018
Young Researchers Support for Nuclei in the Cosmos XV	05/2018

Publications

2025

- Boccioli, L.**, Vartanyan, D., O'Connor, E., Kasen, D. *Neutrino Heating in 1D, 2D, and 3D core-collapse supernovae: characterizing the explosion of high-compactness stars* (2025), submitted to MNRAS
- Boccioli, L.**, Gogilashvili, M., Murphy, J., O'Connor, E. *Quantifying the Impact of the Si/O Interface in CCSN Explosions Using the Force Explosion Condition* (2025), accepted to MNRAS

2024

- Boccioli, L.**, Fragione, G. *Remnant masses from 1D+ core-collapse supernovae simulations: Bimodal neutron star mass distribution and black holes in the low-mass gap* (2024), Phys. Rev. D 110, 023007
- Kumar, S., **Boccioli, L.** *To Explode or Not Explode? An Analysis of the Explodability of Binary and Single Stars* (2024), Res. Notes AAS 8 302

Boccioli, L., Roberti, L. *The physics of Core-Collapse Supernovae: explosion mechanism and explosive nucleosynthesis* (2024), *Universe* 10(3), 148

2023

Boccioli, L., Roberti, L., Limongi, M., Mathews, G. J., Chieffi, A. *Explosion mechanism of core-collapse supernovae: role of the Si/O interface* (2023), *ApJ*, 949, 17

2022

Boccioli, L., Mathews, G. J., Suh, I., O'Connor, E. P. *Effect of the Nuclear Equation of State on Relativistic-Turbulence Induced Core-Collapse Supernovae* (2022), *ApJ* 926, 147

2021

Boccioli, L., Mathews, G. J., O'Connor, E. P. *General Relativistic Neutrino-Driven Turbulence in One-Dimensional Core-Collapse Supernovae* (2021), *ApJ* 912, 29

2020

Pizzone, R. G., ..., **Boccioli, L.**, ... *Indirect measurement of the $^3\text{He}(n,p)^3\text{H}$ reaction cross section at Big Bang energies* (2020), *Eur. Phys. J. A* 56, 199

Mathews, G. J., **Boccioli, L.**, Hidaka, J., Kajino, T. *New Insights into Uncertainties in the Relic Neutrino Background and Effects from the Nuclear Equation of State* (2020), *MPLA* 35, 25

Presentations

Invited Seminars/Colloquia

Astrophysics Seminar, Los Alamos National Laboratory	11/2024
Physics Division Seminar, Oak Ridge National Laboratory	11/2024
Nuclear Theory Seminar, Lawrence Berkeley National Laboratory	02/2024
RIT, Rochester (NY), (Remote)	02/2024
Florida State University (Tallahassee, FL)	09/2023
CIERA, Northwestern University (Evanston, IL)	05/2023
Astrophysics Seminar (University of Notre Dame, IN)	04/2019
Astrophysics Seminar (University of Perugia, Italy)	06/2018

International Conference & Workshop Presentations

Invited

SIMPLE workshop (CSFK, Budapest, Hungary)	01/2025
SNEWS2.0 collaboration meeting (Purdue University, IN)	08/2022

Contributed

s, i & r Element Nucleosynthesis (sirEN) Conference (Giulianova, Italy)	06/2025
IReNA-CeNAM: Frontiers in Nuclear Astrophysics Meeting (Athens, OH)	05/2025
8th p-process workshop (Remote, Budapest, Hungary)	10/2024
Neutrino Frontiers (GGI, Florence, Italy)	07/2024
Solving the Boltzmann Equation for Neutrino Transport (ICERM, Providence, RI)	06/2024
N3AS Annual Meeting (Berkeley, CA)	06/2024
APS April Meeting (Sacramento, CA)	04/2024
ZTF Theory Network Meeting (Santa Margarita, CA)	09/2023
MICRA 2023 (ECT*, Trento, Italy)	09/2023
CeNAM Frontiers in Nuclear Astrophysics (FRIB, East Lansing, MI)	05/2023
APS April meeting (Minneapolis, MN)	04/2023
Workshop 3D Supernova (Remnants) (Valencia, Spain)	09/2022
13th Torino workshop (Perugia, Italy)	06/2022
JINA-CEE Frontiers in Nuclear Astrophysics (South Bend, IN)	05/2022
APS April meeting (New York City, NY)	04/2022
APS DNP meeting (Virtual)	10/2021
Marcel-Grossman meeting (Virtual)	07/2021
American Physical Society meeting (Virtual)	04/2021
Midwest Relativity Meeting (University of Notre Dame, IN)	10/2020
American Physical Society meeting (Denver, CO)	04/2019

Posters

Nuclei in the Cosmos XVIII (Girona, Spain)	06/2025
Theories of Astrophysical Big Bangs (RIKEN, Tokyo, Japan)	02/2025

Nuclei in the Cosmos XVI (Virtual)	09/2021
JINA-CEE Frontiers meeting (Michigan State University, MI)	05/2019
Colleges of Science & Engineering Joint Annual Meeting (University of Notre Dame, IN)	12/2018

Workshops & Schools

Life and Death: From Stars to Compact Objects	08/2022
iCERM: Advances and Challenges in Computational Relativity	09/2020
FRIB-TA Summer School: Dense matter in Astrophysics	06/2020
JINA Frontiers meeting Junior Researchers workshop	05/2019
Nuclei in the Cosmos XV Satellite School	06/2018

Teaching Experience

Invited Lecturer at “IReNA Frontiers Summer School”, Ohio University	05/2025
Main instructor for “Computational Lab in QM”, University of Notre Dame	01/2023 - 05/2023
Grading, tutoring, and Lab TA experience, University of Notre Dame	08/2017 - 12/2021
Main instructor for “Computational Lab in QM”, University of Notre Dame	02/2021 - 05/2021
Co-instructor for “Computational Lab in QM”, University of Notre Dame	01/2020 - 05/2020
Tutoring experience, University of Perugia	01/2016 - 06/2017

Outreach and Service

N3AS Mentor of two undergraduate students	2024-2025
Member of Graduate Student Faculty Search Advisory Committee (UND)	Spring 2022
Science Alive at the public library: annual ExPAND outreach event	02/2019

Skills

Computational Experience

Advanced experience: Python, Fortran, HPC
Moderate experience: C/C++, Matlab, Bash

Languages

Italian (native), English (fluent), Spanish (basic), French (basic)