

Davide Lazzati

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EDUCATION

- 2001, PhD. Astronomy. Università Statale di Milano, Italy. Supervisor: Dr. Gabriele Ghisellini.
- 1996, Laurea (i.e. BS), Physics, Università Statale di Milano, Italy. Supervisor: Prof. Riccardo Giacconi

RESEARCH INTERESTS

High-energy astrophysics, multi-messenger astrophysics, cosmic dust, quantum chemistry, soft condensed matter, numerical methods, hydrology.

APPOINTMENTS

- Since July 2021: Physics Department Head, Oregon State University
- Since September 16, 2020: Professor, Department of Physics, Oregon State University
- September, 2016 – September, 2020: Associate Professor, Department of Physics, Oregon State University
- December 2013 – September 2016: Associate Professor without tenure, Department of Physics, Oregon State University
- August 2013 – December 2013: Associate Professor with tenure, Department of Physics, North Carolina State University
- August 2008 – August 2013: Assistant Professor, Department of Physics, North Carolina State University,
- September 2004 – July 2008: Senior Research Associate: JILA, University of Colorado, Boulder, CO,
- September 2002 – August 2004: PPARC postdoctoral fellow: Institute of Astronomy, University of Cambridge, Cambridge, UK
- October 2000 – August 2002: Institute theory postdoc: Institute of Astronomy, University of Cambridge, Cambridge, UK

PUBLICATIONS

168 publications in international peer-reviewed journals

133 non peer-reviewed publications

3 book chapters

4 press releases

9220 citations; h-factor: 51 (source: Astrophysics Data System)

Most important publications:

1. [Lazzati, D.](#), Rossi, E., Covino, S., Ghisellini, G., Malesani, D. **2002**, “The afterglow of GRB021004: surfing on density waves”, *Astronomy & Astrophysics*, **396**, L5
2. [Lazzati, D.](#), Covino, S., Ghisellini, G. **2002**, “On the role of extinction in failed gamma-ray burst optical/infrared afterglows”, *Monthly Notices of the Royal Astronomical Society*
3. [Lazzati, D.](#), **2008**, “Non-local thermodynamic equilibrium dust nucleation in subsaturated vapours”, *Monthly Notices of the Royal Astronomical Society*, **384**, 165
4. [Lazzati, D.](#), Morsony, B. J., Begelman, M. C., **2009**, “Very High Efficiency Photospheric Emission in Long-Duration γ -Ray Bursts”, *The Astrophysical Journal*, **700**, L47
5. [Lazzati, D.](#), Morsony, B.J., Margutti, R., Begelman, M.C., **2013**, “Photospheric Emission as the Dominant Radiation Mechanism in Long-Duration Gamma-Ray Bursts”, *The Astrophysical Journal*, **765**, 103.
6. Chhotray, A., [Lazzati, D.](#) **2015**, “Gamma-ray Burst Spectra and Spectral Correlations from Sub-photospheric Comptonization”, *The Astrophysical Journal*, **802**, 132
7. [Lazzati, D.](#) **2016**, “Monte Carlo Radiation Transfer Simulations of Photospheric Emission in Long-duration Gamma-ray Bursts”, *The Astrophysical Journal*, **829**, 76
8. Perna, R., [Lazzati, D.](#), Giacomazzo, B. **2016**, “Short Gamma-Ray Bursts from the Merger of Two Black Holes”, *The Astrophysical Journal Letters*, 821, L18
9. [Lazzati, D.](#), Deich, A., Morsony, B. J., and Workman, J. C. **2017** “Off-axis emission of short γ -ray bursts and the detectability of electromagnetic counterparts of gravitational-wave-detected binary mergers”, *Monthly Notices of the Royal Astronomical Society*, **471**, 1652
10. [Lazzati, D.](#), López-Cámara, D., Cantiello, M. et al., **2017** “Off-axis Prompt X-Ray Transients from the Cocoon of Short Gamma-Ray Bursts”, *The Astrophysical Journal*, **848**, L6
11. [Lazzati, D.](#), et al. **2018**, “Late time afterglow observations reveal a collimated relativistic jet in the ejecta of the binary neutron star merger GW170817”, *Physical Review Letters*, **120**, 241103
12. Mauney, C., [Lazzati, D.](#) **2018**, “The formation of astrophysical Mg-rich silicate dust”, *Molecular Astrophysics*, **12**, 1
13. Parsotan, T., López-Cámara, D., [Lazzati, D.](#) **2018**, “Photospheric Emission from Variable Engine Gamma-Ray Burst Simulations”, *The Astrophysical Journal*, **869**, 103
14. Perna, R., Lazzati, D., Cantiello, M. **2021**, “Electromagnetic Signatures of Relativistic Explosions in the Disks of Active Galactic Nuclei”, *The Astrophysical Journal Letters*, **906**, L7

PRESENTATIONS

Conference Presentations

More than 50 conference presentations between 2001 and 2021; 36 of which invited.

Invited Seminars and Colloquia

- “Multimessenger Astrophysics: what we learned from GW170817 and what to expect from the future”, UNAM, Mexico, August 2020
- “Multimessenger Astrophysics”, Oregon State University, October 2019
- “Electromagnetic emission from binary neutron star mergers”, University of Washington, October 2019
- “Electromagnetic emission from binary neutron star mergers”, Reed College, October 2019
- “Electromagnetic emission from binary neutron star mergers”, Goddard Space Flight Center, October 2019

- “Cocoons, structured jets, and the non-thermal emission of binary neutron star mergers”, National Radio Astronomical Observatory, Socorro, NM, May 2018
- “Cocoons, structured jets, and the non-thermal emission of binary neutron star mergers”, Texas Tech University, Lubbock, TX, Apr 2018
- “Cocoons, structured jets, binary neutron star mergers, and GW170817”, University of Oregon, Eugene, OR, Jan 2018
- “Gamma-ray bursts jet dynamics and their radiation properties”, University of Stony Brook, NY, May 2017
- “Cosmic dust nucleation and growth in explosive environments”, University of California at Santa Cruz, February 2017
- “Short Gamma-Ray Bursts from the Merger of Two Black Holes”, University of Oregon, June 2016
- “Dust formation in stellar explosions: the interplay between chemistry and condensation”, Willamette College, April 2016
- “Observing Gamma-Ray Bursts with a Computer”, Reed College, Portland, October 2015
- “Observing Gamma-Ray Bursts with a Computer”, Oregon State University, Corvallis, October 2015
- “Photospheric Emission in Gamma-Ray Bursts”, Riken, Tokyo, Japan, August 2015
- “The Jets of Short and Long Gamma-Ray Bursts”, Purdue, Lafayette, March 2015
- “The prompt phase of gamma-ray bursts”, IASF, Rome, Dec. 2014
- “Dust Formation in Stellar Explosions”, University of Oregon, May 2014
- “Dust Formation in Stellar Explosions”, University of Wisconsin Madison, May 2014
- “Dust Formation in Stellar Explosions”, Harvard ITC, May, 2014
- “The prompt emission of gamma-ray bursts”, George Washington University, April 2014
- “Dust Formation in Stellar Explosions”, Oregon State University, February 2014
- “Gamma-Ray Bursts”, Oregon State University, July 2013
- “Gamma-Ray Bursts”, Virginia Tech, Sept 21, 2012
- “Gamma-Ray Bursts”, NCSU, Sept 10, 2012
- “Formation, Aggregation, and Destruction of Nanoparticles: from the Laboratory to the Stars”, Utah State University, Sept. 4, 2012
- “Gamma-Ray Bursts”, Wake Forest University, Feb 15, 2012
- “Relativistic outflows, their engines, and their progenitors: a new view on what shapes GRB light curves”, UNLV, Jan 22, 2010

AWARDS, SCHOLARSHIPS, AND GRANTS (combined \$2,213,754 plus €7,500 as PI or Awardee)

- 2021 Oregon State University Impact Award for Outstanding Scholarship
- Combined ~1.5 million SBU2 computing units at NASA massively parallel supercomputers (Columbia and Pleiades) between 2006 and 2021
- NSF Astronomy and Astrophysics Grant (AAG): “Collaborative Research: Combining Theory with Observations to Unlock the Multi-messenger Physics of Compact Binary Mergers”, 2019 (\$336,854)
- NASA Astrophysics Research and Analysis: “Dust from supernovae: formation, resilience to sputtering and explosion, and diffusion in the interstellar medium”, 2018 (\$371,822)
- NASA Chandra Guest Investigator, Cycle 20: “The afterglows of binary neutron-star mergers: telling a jet from a balloon”, 2018 (\$70,000)
- NASA Fermi Guest Investigator, Cycle 11: “Prompt gamma-ray emission from cocoon internal shocks in binary neutron star mergers”, 2018 (\$55,000)

- NASA Astrophysics Theory Program: “Short Duration Gamma-Ray Bursts in the Multimessenger Era”, 2017 (\$439,454)
- NASA Swift Guest Investigator: “Numerical Simulations of Early Afterglows and Optical/Infrared Flashes: An Untapped Gold Mine”, 2013 (\$34,000)
- NASA Fermi Guest Investigator: “Photospheric Emission of Magnetized and Extreme Gamma-Ray Burst Jets”, 2012 (\$75,000)
- NSF CAREER: “CAREER: Understanding Stellar Forges: The Properties and the Physics of Formation of Cosmic Dust”, 2012—2018 (\$646,997)
- NCSU Faculty Professional and Research Development: “Macromolecules, Clusters, and the Formation of Dust in the Astrophysical Environment” 2011 (\$4,000)
- NASA Fermi Guest Investigator: “Properties and non-Thermal Features of the Photospheric Emission in Long-Duration Gamma-Ray Bursts”, 2010 (\$100,000)
- NASA Swift Guest Investigator: “X-ray flares: the last breath of the inner engine”, 2008 (\$40,000)
- NASA Swift Guest Investigator: “Modeling afterglows with Jitter radiation”, 2007 (\$40,000)
- Gratton prize for the best Italian Ph. D. dissertation, 2003 (€ 7,500)

EVENT ORGANIZATION:

- Chair of the SOC and LOC of the international conference “F.O.E. – Fifty One Erg”, held in Corvallis, OR, June 5-8, 2017, <http://www.science.oregonstate.edu/~lazzatid/FOE2017/>. 100 participants.
- SOC and LOC Chair for the international conference “The Prompt Activity of Gamma-Ray Bursts: their Progenitors, Engines, and Radiation Mechanisms”, held in Raleigh, NC, March 5-7, 2011, http://grb.physics.ncsu.edu/GRB_2011/WEB/index.html. 80 participants.
- LOC chair and SOC member of the international conference “F.O.E. – Fifty One Erg”, held in Raleigh, NC, May 13-17, 2013, <http://grb.physics.ncsu.edu/FOE2013/WEB/index.html>. 120 participants
- Member of the SOC of the international conference “F.O.E. – Fifty One Erg”, held in Raleigh, NC, June 1-5, 2015, <https://www.physics.ncsu.edu/FOE2015/>, 120 participants
- Member of the SOC of the international conference “Deciphering the Violent Universe”, to be held in Playa del Carmen, Mexico, December 11-15, 2017

TEACHING AND MENTORING EXPERIENCE

Oregon State University (2014 – present)

- PH104 – Introductory Astronomy (six times)
- PH211H – Honors General Physics with Calculus (two times)
- PH365/366 – Computational Physics Lab
- PH423 – Energy and Entropy (one time)
- PH429 – Paradigms: Reference Frames (two times)
- PH435 – Capstones in Physics: Mechanics (three times)
- PH455/555 – Astrophysics (six times), developer of the course
- PH562 – Graduate Mathematical Physics (two times)

NC State University (2008 – 2013)

- PY212 – College Physics II, 4 times
- PY411 – Mechanics I, 3 times
- PY412 – Mechanics II, 2 times
- PY299 – Introduction to scientific computing, 2 times co-developer of the course

University of Colorado (2007)

- ASTR2010 – Cosmology

Postdoctoral mentoring:

- Gustavo Soares: March 2021 – present, research area: numerical simulation of gamma-ray burst outflows.
- Diego Lopez-Camara: Nov. 2011 – Dec. 2013, research area: numerical simulation of gamma-ray burst outflows.
- David W. Fallest: Aug. 2012 – May 2013, co-advised, research area: dust formation in supernova ejecta.

Graduate Students Advised:

- 2009 – 2012, David W. Fallest, (NC State - Ph. D.). Thesis title: “Kinetic Nucleation Theory and Thermal Fluctuations in the Formation of Cosmic Dust”.
- 2011 – 2014, Lin Ning, (NC State - non-thesis Master). Thesis title: “The early afterglow of gamma-ray bursts”.
- 2012 – 2017, Atul Chhotray, (NCSU/OSU - Ph.D.). Thesis title: “Radiative Acceleration and Emission from Relativistic Outflows”.
- 2013 – 2017, Christopher Mauney: (NCSU/OSU - Ph.D.). Thesis title: “The formation of astrophysical dust”.
- 2018 – 2021, Isabel Rodriguez: (OSU - MS). Thesis title: “Journey to the center of GW170817 – Bayesian parameter estimation of outflows from binary neutron star mergers”
- 2015 – 2021, Tyler Parsotan: (OSU - Ph.D.), research area: long and short duration gamma-ray bursts.
- 2019 – present, Job Guidos (OSU – MS), research area: granular astrophysics
- 2021 – present, Nathan Walker (OSU – PhD), research area: long and short duration gamma-ray bursts

Undergraduate mentoring:

~25 undergraduate students mentored on research projects between 2008 and 2020, 6 refereed papers published with them as first authors (Adam Keith, Eric Stringer) or co-authors (Chris Blackwell, Michelle Villeneuve, and Alex Deich), see list at the end.

Faculty mentor for the OSU/LBCC RockSat-C NASA Program

OUTREACH, PROFESSIONAL ACTIVITIES/SERVICE

Outreach and Engagement

- 2016 – present: OMSI Science Communication Fellow
- 2019 Jr. Lego League Mentor
- 2018 Academy of Lifelong Learning Speaker
- OSU 2017 Solar Eclipse Team
- Faculty adviser for the OSU Astronomy Open House and the OSU Astronomy Club
- Outreach talk in Spanish at the NC Museum of Natural Sciences “Science Café”, Dec. 2013
- Outreach talk at the NewCompStar school in Barcelona, Sept. 2014
(<http://www.ub.edu/ubtv/video/objetos-compactos-y-agujeros-negros>)

Journal Reviewer

Astronomy and Astrophysics
The Astrophysical Journal
Monthly Notices of the Royal Astronomical Society
Geochimica et Cosmochimica Acta
Nature
Science
Physical Review

Proposal Reviewer:

NASA Astrophysics Theory Program
NASA Fermi Guest Investigator Program
NASA Astrophysics Research and Analysis
NASA MO and SMEX (Step 1 and Step 2, Form Lead)
NASA Chandra Guest Investigator Program
NASA Postdoctoral Program
NSF Multi-messenger astrophysics
NSF Graduate Fellowship Research Program
NWO VIDI Program (Netherlands)
ISF Program (Israel)
OPUS Program (Poland)
PRIN program (Italy)

Societies

American Astronomical Society
American Physical Society