

Filippo Santoliquido

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Academic positions

Sep. 2023 - *now* **Postdoctoral researcher**, *Gran Sasso Science Institute (GSSI)*, L'Aquila, Italy.
Jan. 2023 - Sep. 2023 **Postdoctoral researcher**, *University of Padova*, Padova, Italy.

Education

Oct. 2019 - Apr. 2023 **PhD student in Astrophysics**, *University of Padova*, 03/04/2023.
Oct. 2017 - Sep. 2019 **Master Student in Astronomy**, *University of Padova*, 110/110, 26/09/2019.
Sep. 2014 - Sep. 2017 **Bachelor Student in Physics**, *University of Trento*, 104/110, 25/09/2017.

Scientific visits

Feb. 1 - Jul. 31 2022 **Astroparticule et Cosmologie laboratory**, Paris, France.
May. 30 - Jun. 2 **Observatoire de la Côte d'Azur**, Nice, France.

Awards, Prizes and Grants

May 2023 **Tacchini Prize**, 2k euros, <https://www.sait.it/node/751>.
Oct. 2019 - **Travel grants**, 1.2k euros.
in the next section, I will mark with a * conferences and seminars for which I have been awarded any kind of financial aid.
Feb. 2022 - Jul. 2022 **Erasmus+ Trainee Programme**, *APC laboratory*, Paris, France, 2.1k euros.
Jun. 2019 **Merit award**, *University of Trento*, 4k euros.
Feb. 2017 - Jul. 2017 **Erasmus+ Programme**, *University of Coimbra*, 2k euros.

Invited Colloquia and Seminars

Aug. 6, 2024 * **Invited speaker at University Andrés Bello**, Santiago, Chile.
Mar. 22, 2024 **Invited speaker at LNGS, INFN**, L'Aquila, Italy.
Sep. 22, 2022 * **Invited speaker at University of Milano-Bicocca**, Milan, Italy.
Jun. 24, 2021 **Invited speaker at the Institut d'Astrophysique de Paris (IAP)**, Paris, France.
Apr. 13, 2021 **Invited speaker at SISSA Astrophysics Colloquium**, Trieste, Italy.

Conferences and Workshops

Oct. 2024 **Contributed talk at the workshop "Challenges and future perspectives in gravitational-wave astronomy: O4 and beyond"**, Leiden, Netherlands.
Jul. 2024 **Contributed talk at the 41ST LIAC**, Liège, Belgium.
Jun. 2024 **Participated at the workshop "Fundamental Physics in the Era of Big Data and Machine Learning"**, ACP, Aspen, USA.

- May. 2024 **Contributed talk at the XIV ET Symposium**, Maastricht, Netherlands.
- Nov. 2023 **Contributed Talk at the Fourth EPS Conference on Gravitation: Black Holes**, Valencia, Spain.
- Oct. 2023 **Poster at GraSP23**, Pisa, Italy.
- Oct. 2023 **Contributed Talk at IV Gravi-Gamma-Nu workshop**, GSSI, Italy.
- Jul. 2023 **Panelist at GWPOPNEXT**, University of Milano-Bicocca, Italy.
- May 2023 **Contributed Talk at XIII ET symposium**, Cagliari, Italy.
- Jun. 2022 **Contributed Talk at EAS2022**, Valencia, Spain.
Annual meeting of the European Astronomical Society. I held a talk at the symposium: "Gravitational Wave and Multi-messenger Astronomy: current results and future perspectives".
- Apr. 2022 **Contributed Talk at APS meeting**, New York City, New York, USA.
- Jun. 2022 * **Bayesian Deep Learning in Astrophysics**, Paris, France.
- Dec. 2021 **Contributed Talk at GWday**, Padova, Italy.
- Jul. 2021 **Contributed Talk at Amaldi14**, Melbourne, Australia.
- Jun. 2021 **Poster at EAS2021**, Leiden, Netherlands.
Annual meeting of the European Astronomical Society. I presented a poster at the symposium: "The Birth, Life, and Death of Black Holes".
- May 2021 **Contributed Talk at 3rd Workshop on Chemical Abundances in Gaseous Nebulae**, Universidade do Vale do Paraíba, São José dos Campos, Brazil.
- May 2021 **#4 Gravitational Wave Open Data Workshop**, Virtual meeting.
- Apr. 2021 * **Contributed Talk at The fourth assembly of the Groupement de Recherche Ondes Gravitationnelles**, Paris, France.
- Mar. 2021 **Poster at 55th Rencontres de Moriond 2021**, La Thuile, Italy.
- Feb. 2021 **Contributed Talk at annual TEONGRAV meeting**, Virtual meeting.
- Jun. 2020 **Poster at EAS2020**, Leiden, Netherlands.
Annual meeting of the European Astronomical Society. I presented a poster at the symposium: "What have we learned from the observed population of gravitational wave sources?".
- Mar. 2020 **Invited talk at Mock Innsbruck**, Innsbruck, Austria.

Referee

Monthly Notices of the Royal Astronomical Society (MNRAS) .
The Astrophysical Journal (ApJ).

Teaching and Mentoring

- Aug. 2024 **Lecturer of the course "Gravitational Wave Astrophysics" during the school "Cosmological History: from Gravitational Waves to Exoplanets", ICTP-SAIFR/IFT-UNESP**, São Paulo, Brazil, 4 h.
- Mar. 2022 **Co-supervisor of Lorenzo Merli's master thesis.**
- Dec. 2021 **Co-supervisor of Roberta Rufolo's master thesis.**
- Nov. 2021 **Physics Lab assistant**, University of Padova, Padova, Italy, 20 h.

- Jun. 2021 **Laboratory of Computational Astrophysics**, *University of Padova*, Padova, Italy, 12 h.
- Nov. 2020 **Physics Lab assistant**, *University of Padova*, Padova, Italy, 20 h.

Affiliations, Memberships and Collaborations

- Sep. 2023 **Virgo**, *member of the LIGO-Virgo-KAGRA collaboration*.
- Jun. 2022 **Einstein Telescope**, *Observation Science Board*.
- Apr. 2022 **AAS**, *American Astronomical Society*.
- Apr. 2021 **EAS**, *European Astronomical Society*.
- Oct. 2019 **INFN**, *Istituto Nazionale di Fisica Nucleare*.
- May 2018 **SIF**, *Società Italiana di Fisica*.

Public Outreach

- Sep. 2024 **Night of Researchers**, *GSSI*, volunteer at SHARPER, L'Aquila, Italy.
- Sep. 2023 **Night of Researchers**, *GSSI*, volunteer at SHARPER, L'Aquila, Italy.
- Nov. 2020 **Night of Researchers**, *University of Padova*, Virtual meeting.
- Oct. 2018 - Mar. 2020 **Guide for the Museum of History of Physics**, *University of Padova*.

Technical Skills

Programming and scripting

- Advanced Python, Jupyter notebooks, Latex
- Intermediate BASH scripting, Parallel computing (CPUs and GPUs)
- Basic MatLab, R, C++, SQL

Operating Systems

- Advanced Linux, iOS, Windows

Versioning and Cloud

- Intermediate Git (see ongoing public projects [here](#)), Google Drive

Main developer

- COSMORATE https://gitlab.com/Filippo.santoliquido/cosmo_rate_public
- GALAXYRATE https://gitlab.com/Filippo.santoliquido/galaxy_rate_open

HPC

- Intermediate I usually run on High Performance Computing (HPC) machines

Schools and Programs

- Apr. 2024 **Introduction to Deep Learning**, CINECA Rome, Italy.
- Nov. 2022 **ML-INFN Hackathon: Advanced Level**, INFN Bari, Italy.
- Oct. 2022 **Hands-on machine learning course with Python**, OAPd, Padova, Italy.
- Jun. 2021 **First ML-INFN Hackathon**, INFN Firenze-Pisa-CNAF, Italy.
- Jun. 2021 **Summer School in Statistics for Astronomers XVI**, Penn State University, USA.

- Mar. 2021 * **Gravitational waves: a new messenger to explore the universe**, IHP, Paris, France.
- Feb. 2021 **SIGRAV school**, Rome, Italy.
- Jan. 2020 **Multi Messenger Astrophysics School**, *Asiago, Italy*.
- Sep. 2018 * **International School of Space Science**, *GSSI, L'Aquila, Italy*.

Languages

Italian Native speaker
English Excellent

List of Publications

ADS [See here for an interactive and most updated list of publications](#)

ORCID <https://orcid.org/0000-0003-3752-1400>

Google [Scholar](#)

Summary of Publications

36	Total publications
7	Total publications as first author
31	Refereed publications
5	Refereed publications as first author
1684	Total number of citations
281	Total number of citations as first author
22	h-index
4	h-index as first author

Data from [ADS](#) taken on Oct. 20, 2024

First-author peer-reviewed publications

- [1] **Santoliquido, Filippo**, Michela Mapelli, Giuliano Iorio, Guglielmo Costa, Simon C. O. Glover, Tilman Hartwig, Ralf S. Klessen, and Lorenzo Merli. Correction to: Binary black hole mergers from population III stars: uncertainties from star formation and binary star properties. *MNRAS*, 528(1):954–962, February 2024.
- [2] **Santoliquido, Filippo**, Michela Mapelli, Giuliano Iorio, Guglielmo Costa, Simon C. O. Glover, Tilman Hartwig, Ralf S. Klessen, and Lorenzo Merli. Binary black hole mergers from population III stars: uncertainties from star formation and binary star properties. *MNRAS*, 524(1):307–324, September 2023.
- [3] **Santoliquido, Filippo**, Michela Mapelli, M. Celeste Artale, and Lumen Boco. Modelling the host galaxies of binary compact object mergers with observational scaling relations. *MNRAS*, 516(3):3297–3317, November 2022.
- [4] **Santoliquido, Filippo**, Michela Mapelli, Nicola Giacobbo, Yann Bouffanais, and M. Celeste Artale. The cosmic merger rate density of compact objects: impact of star formation, metallicity, initial mass function, and binary evolution. *MNRAS*, 502(4):4877–4889, April 2021.
- [5] **Santoliquido, Filippo**, Michela Mapelli, Yann Bouffanais, Nicola Giacobbo, Ugo N. Di Carlo, Sara Rastello, M. Celeste Artale, and Alessandro Ballone. The Cosmic Merger Rate Density Evolution of Compact Binaries Formed in Young Star Clusters and in Isolated Binaries. *ApJ*, 898(2):152, August 2020.

Other peer-reviewed publications

- [6] Boyuan Liu, Tilman Hartwig, Nina S. Sartorio, Irina Dvorkin, Guglielmo Costa, **Santoliquido, Filippo**, Anastasia Fialkov, Ralf S. Klessen, and Volker Bromm. Gravitational waves from mergers of Population III binary black holes: roles played by two evolution channels. *MNRAS*, 534(3):1634–1667, November 2024.

- [7] Benedetta Mestichelli, Michela Mapelli, Stefano Torniamenti, Manuel Arca Sedda, Marica Branchesi, Guglielmo Costa, Giuliano Iorio, and **Santoliquido, Filippo**. Binary black hole mergers from Population III star clusters. *Astronomy and Astrophysics*, 690:A106, October 2024.
- [8] Ligo Scientific Collaboration, VIRGO Collaboration, and Kagra Collaboration. Observation of Gravitational Waves from the Coalescence of a 2.5–4.5 M_{\odot} Compact Object and a Neutron Star. *ApJ Letters*, 970(2):L34, August 2024.
- [9] Carole P  rigois, Michela Mapelli, **Santoliquido, Filippo**, Yann Bouffanais, and Roberta Rufolo. Binary Black Hole Spins: Model Selection with GWTC-3. *Universe*, 9(12):507, December 2023.
- [10] Guglielmo Costa, Michela Mapelli, Giuliano Iorio, **Santoliquido, Filippo**, Gast  n J. Escobar, Ralf S. Klessen, and Alessandro Bressan. Massive binary black holes from Population II and III stars. *MNRAS*, 525(2):2891–2906, October 2023.
- [11] Biswajit Banerjee, Gor Oganessian, Marica Branchesi, Ulyana Dupletsa, Felix Aharonian, Francesco Brighenti, Boris Goncharov, Jan Harms, Michela Mapelli, Samuele Ronchini, and **Santoliquido, Filippo**. Pre-merger alert to detect prompt emission in very-high-energy gamma-rays from binary neutron star mergers: Einstein Telescope and Cherenkov Telescope Array synergy. *Astronomy and Astrophysics*, 678:A126, October 2023.
- [12] Giuliano Iorio, Michela Mapelli, Guglielmo Costa, Mario Spera, Gast  n J. Escobar, Cecilia Sgalletta, Alessandro A. Trani, Erika Korb, **Santoliquido, Filippo**, Marco Dall’Amico, Nicola Gaspari, and Alessandro Bressan. Compact object mergers: exploring uncertainties from stellar and binary evolution with SEVN. *MNRAS*, 524(1):426–470, September 2023.
- [13] Marica Branchesi, Michele Maggiore, David Alonso, Charles Badger, Biswajit Banerjee, Freija Beirnaert, Enis Belgacem, Swetha Bhagwat, Guillaume Boileau, Ssohrab Borhanian, Daniel David Brown, Man Leong Chan, Giulia Cusin, Stefan L. Danilishin, Jerome Degallaix, Valerio De Luca, Arnab Dhani, Tim Dietrich, Ulyana Dupletsa, Stefano Foffa, Gabriele Franciolini, Andreas Freise, Gianluca Gemme, Boris Goncharov, Archisman Ghosh, Francesca Gulminelli, Ish Gupta, Pawan Kumar Gupta, Jan Harms, Nandini Hazra, Stefan Hild, Tanja Hinderer, Ik Siong Heng, Francesco Iacovelli, Justin Janquart, Kamiel Janssens, Alexander C. Jenkins, Chinmay Kalaghatgi, Xhesika Korovesi, Tjonnie G. F. Li, Yufeng Li, Eleonora Loffredo, Elisa Maggio, Michele Mancarella, Michela Mapelli, Katarina Martinovic, Andrea Maselli, Patrick Meyers, Andrew L. Miller, Chiranjib Mondal, Niccol   Muttoni, Harsh Narola, Micaela Oertel, Gor Oganessian, Costantino Pacilio, Cristiano Palomba, Paolo Pani, Antonio Pasqualetti, Albino Perego, Carole P  rigois, Mauro Pieroni, Ornella Juliana Piccinni, Anna Puecher, Paola Puppo, Angelo Ricciardone, Antonio Riotto, Samuele Ronchini, Mairi Sakellariadou, Anuradha Samajdar, **Santoliquido, Filippo**, B. S. Sathyaprakash, Jessica Steinlechner, Sebastian Steinlechner, Andrei Utina, Chris Van Den Broeck, and Teng Zhang. Science with the Einstein Telescope: a comparison of different designs. *Journal of Cosmology and Astroparticle Physics*, 2023(7):068, July 2023.
- [14] S. Ronchini, M. Branchesi, G. Oganessian, B. Banerjee, U. Dupletsa, G. Ghirlanda, J. Harms, M. Mapelli, and **Santoliquido, F.** Perspectives for multimessenger astronomy with the

next generation of gravitational-wave detectors and high-energy satellites. *Astronomy and Astrophysics*, 665:A97, September 2022.

- [15] Barbara Patricelli, Maria Grazia Bernardini, Michela Mapelli, Paolo D’Avanzo, **Santoliquido, Filippo**, Giancarlo Cella, Massimiliano Razzano, and Elena Cuoco. Prospects for multimessenger detection of binary neutron star mergers in the fourth LIGO-Virgo-KAGRA observing run. *MNRAS*, 513(3):4159–4168, July 2022.
- [16] Carole P  rigois, **Santoliquido, Filippo**, Yann Bouffanais, Ugo N. Di Carlo, Nicola Giacobbo, Sara Rastello, Michela Mapelli, and Tania Regimbau. Gravitational background from dynamical binaries and detectability with 2G detectors. *Physical Review D*, 105(10):103032, May 2022.
- [17] Rosalba Perna, M. Celeste Artale, Yi-Han Wang, Michela Mapelli, Davide Lazzati, Cecilia Sgalletta, and **Santoliquido, Filippo**. Host galaxies and electromagnetic counterparts to binary neutron star mergers across the cosmic time: detectability of GW170817-like events. *MNRAS*, 512(2):2654–2668, May 2022.
- [18] Michela Mapelli, Yann Bouffanais, **Santoliquido, Filippo**, Manuel Arca Sedda, and M. Celeste Artale. The cosmic evolution of binary black holes in young, globular, and nuclear star clusters: rates, masses, spins, and mixing fractions. *MNRAS*, 511(4):5797–5816, April 2022.
- [19] Alessandro A. Trani, Sara Rastello, Ugo N. Di Carlo, **Santoliquido, Filippo**, Ataru Tanikawa, and Michela Mapelli. Compact object mergers in hierarchical triples from low-mass young star clusters. *MNRAS*, 511(1):1362–1372, February 2022.
- [20] Marco Dall’Amico, Michela Mapelli, Ugo N. Di Carlo, Yann Bouffanais, Sara Rastello, **Santoliquido, Filippo**, Alessandro Ballone, and Manuel Arca Sedda. GW190521 formation via three-body encounters in young massive star clusters. *MNRAS*, 508(2):3045–3054, December 2021.
- [21] Yann Bouffanais, Michela Mapelli, **Santoliquido, Filippo**, Nicola Giacobbo, Ugo N. Di Carlo, Sara Rastello, M. Celeste Artale, and Giuliano Iorio. New insights on binary black hole formation channels after GWTC-2: young star clusters versus isolated binaries. *MNRAS*, 507(4):5224–5235, November 2021.
- [22] Sara Rastello, Michela Mapelli, Ugo N. Di Carlo, Giuliano Iorio, Alessandro Ballone, Nicola Giacobbo, **Santoliquido, Filippo**, and Stefano Torniamenti. Dynamics of binary black holes in low-mass young star clusters. *MNRAS*, 507(3):3612–3625, November 2021.
- [23] Michela Mapelli, **Santoliquido, Filippo**, Yann Bouffanais, Manuel Arca Arca Sedda, Maria Celeste Artale, and Alessandro Ballone. Mass and Rate of Hierarchical Black Hole Mergers in Young, Globular and Nuclear Star Clusters. *Symmetry*, 13(9):1678, September 2021.
- [24] Yann Bouffanais, Michela Mapelli, **Santoliquido, Filippo**, Nicola Giacobbo, Giuliano Iorio, and Guglielmo Costa. Constraining accretion efficiency in massive binary stars with LIGO-Virgo black holes. *MNRAS*, 505(3):3873–3882, August 2021.

- [25] Michela Mapelli, Marco Dall'Amico, Yann Bouffanais, Nicola Giacobbo, Manuel Arca Sedda, M. Celeste Artale, Alessandro Ballone, Ugo N. Di Carlo, Giuliano Iorio, **Santoliquido, Filippo**, and Stefano Torniamenti. Hierarchical black hole mergers in young, globular and nuclear star clusters: the effect of metallicity, spin and cluster properties. *MNRAS*, 505(1):339–358, July 2021.
- [26] Ugo N. Di Carlo, Michela Mapelli, Nicola Giacobbo, Mario Spera, Yann Bouffanais, Sara Rastello, **Santoliquido, Filippo**, Mario Pasquato, Alessandro Ballone, Alessandro A. Trani, Stefano Torniamenti, and Francesco Haardt. Binary black holes in young star clusters: the impact of metallicity. *MNRAS*, 498(1):495–506, October 2020.
- [27] Sara Rastello, Michela Mapelli, Ugo N. Di Carlo, Nicola Giacobbo, **Santoliquido, Filippo**, Mario Spera, Alessandro Ballone, and Giuliano Iorio. Dynamics of black hole-neutron star binaries in young star clusters. *MNRAS*, 497(2):1563–1570, September 2020.
- [28] Ugo N. Di Carlo, Michela Mapelli, Yann Bouffanais, Nicola Giacobbo, **Santoliquido, Filippo**, Alessandro Bressan, Mario Spera, and Francesco Haardt. Binary black holes in the pair instability mass gap. *MNRAS*, 497(1):1043–1049, September 2020.
- [29] M. Celeste Artale, Yann Bouffanais, Michela Mapelli, Nicola Giacobbo, Nadeen B. Sabha, **Santoliquido, Filippo**, Mario Pasquato, and Mario Spera. An astrophysically motivated ranking criterion for low-latency electromagnetic follow-up of gravitational wave events. *MNRAS*, 495(2):1841–1852, June 2020.
- [30] M. Celeste Artale, Michela Mapelli, Nicola Giacobbo, Nadeen B. Sabha, Mario Spera, **Santoliquido, Filippo**, and Alessandro Bressan. Host galaxies of merging compact objects: mass, star formation rate, metallicity, and colours. *MNRAS*, 487(2):1675–1688, August 2019.
- [31] Michela Mapelli, Nicola Giacobbo, **Santoliquido, Filippo**, and Maria Celeste Artale. The properties of merging black holes and neutron stars across cosmic time. *MNRAS*, 487(1):2–13, July 2019.

Other publications

- [32] The LIGO Scientific Collaboration, the Virgo Collaboration, and the KAGRA Collaboration. A search using GEO600 for gravitational waves coincident with fast radio bursts from SGR 1935+2154. *arXiv e-prints*, page arXiv:2410.09151, October 2024.
- [33] Ulyana Dupletsa, Jan Harms, Ken K. Y. Ng, Jacopo Tissino, **Santoliquido, Filippo**, and Andrea Cozzumbo. Validating Prior-informed Fisher-matrix Analyses against GWTC Data. *arXiv e-prints*, page arXiv:2404.16103, April 2024.
- [34] **Santoliquido, Filippo**, Ulyana Dupletsa, Jacopo Tissino, Marica Branchesi, Francesco Iacovelli, Giuliano Iorio, Michela Mapelli, Davide Gerosa, Jan Harms, and Mario Pasquato. Classifying binary black holes from Population III stars with the Einstein Telescope: a machine-learning approach. *arXiv e-prints*, page arXiv:2404.10048, April 2024.
- [35] Barbara Patricelli, Maria Grazia Bernardini, Michela Mapelli, Paolo D'Avanzo, **Santoliquido, Filippo**, Giancarlo Cella, Massimiliano Razzano, and Elena Cuoco. Erratum: Prospects for

multimessenger detection of binary neutron star mergers in the fourth LIGO-Virgo-KAGRA observing run. *MNRAS*, 514(3):3395–3395, August 2022.

- [36] **Santoliquido, Filippo**. The evolution of compact object mergers and their host galaxies across cosmic time. In *APS April Meeting Abstracts*, volume 2022 of *APS Meeting Abstracts*, page D15.008, April 2022.