

Personal information

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Academic Employment

November 2023 – ongoing **Postdoctoral research**, *INAF-Osservatorio Astronomico di Roma, Rome, Italy*.
Subject: Ultraluminous X-ray sources. Resp.: Prof. G. L. Israel.
April 2021 – October 2023 **Postdoctoral research**, *Institut de Recherche en Astrophysique et Planétologie (IRAP), Toulouse, France*.
Subject: *XMM-Newton* (50% duties). Resp.: Prof. N. Webb.

Education

2017 – 2020 **Doctoral degree in Physical Science - Dr. rer. nat.**, *University of Palermo - INAF/IASF Palermo - Eberhard Karls Universität Tübingen*, EQF Level 8
Thesis title: Contribution of pseudo-focused protons to the background of *Athena*. Supervisors: Dr. Teresa Mineo (INAF/IASF Palermo) & Prof. Andrea Santangelo (University of Tübingen). PhD in cotutelle agreement. Thesis defended in March 2021. Final grade: Excellent.
2015 – 2017 **Master Degree in Physics, curriculum Astrophysics**, *University of Palermo*, Palermo, Italy, EQF Level 7
Thesis title: Identification and characterization of the new X-ray pulsator CXOG1b J002415.8-720436 in the globular cluster 47 Tucanae. Supervisors: Prof. Rosario Iaria & Prof. Paolo Esposito. Final grade: 110/110 cum laude.
2017 **Erasmus+ for Traineeship**, *Anton Pannekoek Institute for Astronomy*, Amsterdam, Netherlands, 02 May - 31 July 2017
Supervisor: Prof. Paolo Esposito.
2010 – 2015 **Bachelor Degree in Physical Science**, *University of Palermo*, Palermo, Italy, EQF Level 6
2005 – 2010 **High School Diploma**, *Liceo Classico "Don G. Colletto"*, Corleone (PA), Italy, EQF Level 4

Areas of Expertise

High-energy astrophysics, accretion onto compact objects, X-ray binaries, high-mass X-ray binaries, ultraluminous X-ray sources and super-Eddington accretion, X-ray high-resolution spectroscopy, X-ray background, data mining, X-ray catalogues, X-ray spectroscopy and timing.

(List of publications at the end.)

Conferences

Invited Talks

- 2024 *Ultraluminous X-ray Sources: The physics of accretion at its extreme*, review talk, Congresso Nazionale Oggetti Compatti XIII, Alghero, Italy 23–26 September 2024

Contributed Talks

- 2025 *Black holes or neutron stars? A clustering approach to explore the nature of the compact objects in ULXs*, Vasto accretion meeting 2025, Vasto, Italy, 23–27 June 2025
- 2024 *Investigating the ULX population with machine learning techniques*, XMM-Newton Science Workshop, ESAC, Madrid, Spain, 5–7 June 2024
- 2023 *The ultraluminous X-ray source M81 X-6: a weakly magnetised neutron star with a precessing accretion disc?*, Vasto accretion meeting 2023, Vasto, Italy, 19–23 June 2023
- 2023 *Should Hyperluminous and Ultraluminous X-ray sources fall under the same category?*, The X-ray Universe 2023, Athens, Greece, 13–16 June 2023
- 2022 *The ULX M81 X-6: clues for a precessing disk around a weakly magnetized neutron star*, Congresso Nazionale Oggetti Compatti XII, Cefalù, Italy, 27–30 September 2022
- 2022 *Long-term X-ray variability of the ULX M81 X-6: black hole or neutron star accretor?*, XMM-Newton 2022 Science Workshop, ESAC, Madrid, Spain, 14–17 June 2022
- 2020 *Investigating the wind-fed accretion onto a strongly magnetized neutron star: a high-resolution look at the photoionization wake of Vela X-1*, EAS 2020 (European Astronomical Society Annual Meeting), Leiden (Virtual), 29 June–3 July 2020
- 2020 *Investigating the clumpy environment of Vela X-1: a high-resolution look at its photoionization wake*, EAS 2020 (European Astronomical Society Annual Meeting), Leiden (Virtual), 29 June–3 July 2020

Posters

- 2019 *Search for multiwavelength emission from the binary millisecond pulsar PSR J1836-2354A in the globular cluster M22*, X-ray Astronomy 2019, CNR/INAF Research Area, Bologna, Italy, 8–13 September 2019
- 2018 *Soft proton scattering at grazing incidence*, Exploring the Hot and Energetic Universe: the second scientific conference dedicated to the *Athena* X-ray observatory, Palermo, 24–27 September 2018

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- 2018 *A comprehensive analysis of the X-ray population of M22*, Exploring the Hot and Energetic Universe: the second scientific conference dedicated to the *Athena* X-ray observatory, Palermo, 24–27 September 2018

Attended Conferences

- 2023 EAS 2023 (European Astronomical Society Annual Meeting), 10–14 July 2023, Kraków, Poland
- 2021 EAS 2021 (European Astronomical Society Annual Meeting), 29 June–3 July 2021, virtual
- 2017 72nd Netherlands Astronomy Conference, 28 June–2 July 2017

Meetings, Schools, Workshops, Other Activities

Invited talks

- 2024 *Investigating the ULX population with machine learning techniques*, INAF-IASF Palermo, Italy, 9 July 2024

Contributed Talks

- 2025 *Pulsating ultraluminous X-ray sources: Probing the high-energy tail of high-mass X-ray binaries*, workshop "Feeding the spinning top – Accretion-induced torques onto young and strongly magnetized neutron stars in high-mass X-ray binaries", participation upon invitation, IFCA, Santander, Spain, 3–7 March 2025
- 2024 *From high-mass X-ray binaries to ultraluminous X-ray sources: A (very personal!) journey through the realm of X-ray binaries*, INAF Astronomical Observatory of Rome, 16 January 2024
- 2021 *Soft proton scattering at grazing incidence from X-ray mirrors*, Athena magnetic diverter workshop, virtual, 21 January 2021
- 2020 *High-resolution spectroscopy of Vela X-1 at the orbital phase $\phi_{orb} = 0.75$* , High Energy Astrophysics group meeting, IAAT Tübingen, 15 May 2020
- 2019 *Contribution of pseudo-focused soft protons to the Athena background*, Kepler Center for Astro and Particle Physics PhD Workshop, Obermarchtal, Germany, 30 September - 2 October 2019
- 2019 *Contribution of pseudo-focused soft protons to Athena background - Updates on the EXACRAD project*, High Energy Astrophysics group meeting, IAAT Tübingen, 28 June 2019
- 2018 *Contribution to Athena background due to pseudo-focused soft protons*, INAF-IASF Palermo, 3 May 2018

Attended Meetings, Schools, Workshops

- 2022 35th XMM-SSC and the XMM2ATHENA consortium meetings, Athens, Greece, 18-19 October 2022
- 2022 SIXTE Workshop 2022, remotely, 29-31 March 2022
- 2021 34th XMM-SSC consortium meeting, remotely, 13-14 October 2021
- 2020 8th AtomDB Workshop and Spectroscopy School, virtual, 3-5-August 2020

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- 2019 #10 X-IFU Consortium Meeting, Institut Aéronautique et Spatial (IAS), Toulouse, France, 16-20 September 2019
- 2018 #8 X-IFU Consortium Meeting, École de Physique, Geneva, Switzerland, 4-10 September 2018
- 2018 DIAS Summer School on High-Energy Astrophysics 2018, Dublin Institute for Advanced Studies, Dublin, Ireland, 19-29 June 2018
- 2018 #7 X-IFU Consortium Meeting, Astroparticle and Cosmology Laboratory, Paris, France, 19-24 March 2018
- 2017 5th International School on Geant4, INFN Catania, Catania, Italy, 23-27 October 2017

Approved Observational Proposals

- 2024 Extending the ULX paradigm with XMM-Newton: filling the gap of nearby galaxies, 100 ks XMM-Newton, **PI: R. Amato**, priority C
- 2023 Searching for pulsation in the neutron star ULX candidate M81 X-6, 120 ks XMM-Newton, **PI: R. Amato**, priority C
- 2021, 2022 Observation with *XMM-Newton* of the ultraluminous X-ray source NGC 4190 ULX-1, 120 ks XMM-Newton, **PI: R. Amato**, priority C
- 2018 Swift (XRT) monitoring campaign of three HMXBs, **PI: R. Amato**, 99 ks Swift-XRT (performed)

I am also co-I of many other successful observational proposals for the missions XMM-Newton, Swift, NICER, NuSTAR, XRISM.

Grants

- 2024 INAF MINI-GRANT, 20k euros awarded, project title: Geometry and Nature Of Super-Eddington Sources (GNOSES)
- 2018 AHEAD Data Analysis Program, University of Leicester, Leicester, UK, 4-8 June 2018

Teaching experiences

- 2024 Lecture on ultraluminous X-ray sources for Master Course in Astrophysics of the University of Tor Vergata and relative exams, Rome, Italy
- 2022 Seminar on Ultraluminous X-ray Sources to 2-yr master students of the course in Astrophysics of the University Paul Sabatier and the École Nationale Supérieure de l'Aéronautique et de l'Espace, Toulouse

Service to the Community

- 2024 – Referee for peer-reviewed journals (A&A, AAS).
ongoing
- 2025 Member of the LOC, Vasto accretion meeting 2025, Vasto, Italy, 23–27 June 2025
- 2025 Training course "Safe Zone", Sapienza University of Rome, 22–23 January 2025

- 2024 AO24 *XMM-Newton* review panel
- 2023 Member of the scientific committee for EAS 2023 Special Session SS29: From dormant to ultra-luminous compact objects in X-ray binaries, EAS 2023, Kraków, Poland, 14 July 2023
- 2023 AO23 *XMM-Newton* review panel
- 2022 Review panelist for *XRISM* Guest Scientist programme

Responsibility roles

- 2025–ongoing Manager of the webpage “OAR Seminars” (<https://sites.google.com/inaf.it/oar-seminar/home>) and member of the working group “Seminari” at INAF-OAR
- 2017–2018 PhD student representative of the PhD course in Physics at the University of Palermo, Department of Chemistry and Physics

Laboratory Experience

- 2019 – 2020 Several experimental campaigns to measure the scattering efficiency of low energy protons at grazing incidence from a sample of silicon pore optics. The experiment was part of the EXACRAD (Experimental Evaluation of *Athena* Charged Particle Background from Secondary Radiation and Scattering in Optics) activities, funded by ESA. It was conducted at the Van de Graaff accelerator of the Goethe University (Riedberg Campus), in Frankfurt am Main, Germany.

Outreach

I have taken part to many initiatives to bring astronomy to the citizens, as for example the **European Researchers’ Nights** (in 2017 and 2018). As a women in STEM, I am also trying to bring young girls closer to science, participating in initiatives for the **International Day of Women and Girls in Science (11th of February)**, promoted by national and international X-ray communities. A few recent examples are:

- 2025 “*Chat con un’astronoma*”, International Day of Women and Girls in Science, INAF-OAR, 11 Feb. 2025, <https://www.youtube.com/watch?v=GPHASGSC06o&t=15s>
- 2024 European Researcher’s Nights, 27–28 September 2024, Astronomical Observatory of Rome, Monte Porzio Catone (RM) & Citta’ dell’Altra Economia, Roma, Italy.
- 2024 Outreach event with the students of the middle school of Monte Porzio Catone (RM), Italy, 11 March 2024
- 2024 *Women solving High-energy Astrophysics Mysteries*, poster for the “She rocks science” initiative for the International Day of Women and Girls in Science, Sapienza University of Rome, 12 February 2024, https://astroroberta.com/wp-content/uploads/2025/05/sherocksscience_he_group_page-0001.jpg
- 2021 Video made by the *Athena* community for the International Day of Women and Girls in Science, 11 February 2021, <https://www.youtube.com/watch?v=qFA8MKYe3UI>

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Additional Information

Languages

Italian	Mother tongue	
English	Effective Operational Proficiency	<i>IELTS certification, level C1</i>
French	Basic	<i>Level A2</i>

Digital Skills

Operating systems	MacOS, Linux (Ubuntu), Windows
Advanced-Proficient	X-ray data analysis software and tools (CIAO, XSPEC, FTOOLS, SAS, ISIS, HEN-DRICS, STINGRAY), $\text{\LaTeX}$, Python, command of office suite (word processor, spread sheet, presentation software) for MacOS/Linux/Windows operative systems
Basic-Intermediate	C++, root (CERN), Geant4, website design with WordPress and Google Sites

Scientific Writing

Solid scientific writing skills, improved after completing an online course from Stanford University, held by Dr. Kristin Sainani (certificate available).

Affiliations

- INAF - Osservatorio Astronomico di Roma
- Member of the *Athena* community
- Former member of the *XMM-Newton* Survey Science Centre (SSC) and of the *Athena*/X-IFU Consortium

List of Publications

Peer Reviewed

1. **Amato, R.**, Quintin, E., Tranin, H., Gúrpide Lasheras, A., Webb, N., Godet, O., Israel, G. L., Imbrogno, M., Kammoun, E., Gupta, M. The population of hyperluminous X-ray sources as seen by XMM-Newton. *Astronomy & Astrophysics*, in press; preprint [arXiv:2507.14875](#).
2. Pinciroli Vago, N. O., **Amato, R.**, Imbrogno, M., Israel, G. L., Belfiore, A., Kovlakas, K., Fraternali, P., Pasquato, M. The hunt for new pulsating ultraluminous X-ray sources: a clustering approach. *Astronomy & Astrophysics*, in press; preprint [arXiv:2507.15032](#).
3. Veresvarska, M., Imbrogno, M., **Amato, R.**, Israel, G. L., Scaringi, S., Casella, P., de Martino, D., Fürst, F., Gúrpide Lasheras, A., Knigge, C., Middleton, M. J. Wobbling around the clock: magnetically-driven quasi-periodic oscillations in pulsating ultraluminous X-ray sources. *arXiv e-prints, Monthly Notices of the Royal Astronomical Society*, accepted; preprint [arXiv:2505.05557](#).
4. Kovlakas, K., Misra, D., **Amato, R.**, & Israel, G. L. (2025). Populations of neutron star ultraluminous X-ray sources: Mind your bs and Bs. *Astronomy & Astrophysics*, 694, L9. doi:10.1051/0004-6361/202453274.

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5. Israel, G. L., **Amato, R.**, Imbrogno, M., Pinciroli Vago, N. O., Rodríguez Castillo, G. A., Belfiore, A., Stella, L., Bachetti, M., Fürst, F., Walton, D., Middleton, M., Brightman, M., Pintore, F., Pinto, C., Conforti, S., Zampieri, L., Salvaggio, C., Wolter, A., Tiengo, A., De Luca, A., Esposito, P., Salvaterra, R., Earnshaw, H., Roberts, T., Gúrpide, A., & Motta, S. (2025). Beyond Accretion Limits: The Rise of Pulsating Gems. *Astronomische Nachrichten*, 346(1), e20240102. doi:10.1002/asna.20240102.
6. Abalo, L., Kretschmar, P., Fürst, F., Diez, C. M., El Mellah, I., Grinberg, V., Guainazzi, M., Martínez-Núñez, S., Manousakis, A., **Amato, R.**, Zhou, M., & Beijersbergen, M. W. (2024). Variable structures in the stellar wind of the HMXB Vela X-1. *Astronomy & Astrophysics*, 692, A188. doi:10.1051/0004-6361/202450168.
7. Mineo, T., Fioretti, V., Lotti, S., Molendi, S., Lanzuisi, G., Cappi, M., Dadina, M., Etori, S., Gastaldello, F., & **Amato, R.** (2024). Unveiling the origin of XMM-Newton soft proton flares: II. Systematics in the proton spectral analysis. *Astronomy & Astrophysics*, 691, A230. doi:10.1051/0004-6361/202451232.
8. Fioretti, V., Mineo, T., Lotti, S., Molendi, S., Lanzuisi, G., **Amato, R.**, Macculi, C., Cappi, M., Dadina, M., Etori, S., & Gastaldello, F. (2024). Unveiling the origin of XMM-Newton soft proton flares: I. Design and validation of a response matrix for proton spectral analysis. *Astronomy & Astrophysics*, 691, A229. doi:10.1051/0004-6361/202451231.
9. Imbrogno, M., Motta, S. E., **Amato, R.**, Israel, G. L., Rodríguez Castillo, G. A., Brightman, M., Casella, P., Bachetti, M., Fürst, F., Stella, L., Pinto, C., Pintore, F., Tombesi, F., Gúrpide, A., Middleton, M. J., Salvaggio, C., Tiengo, A., Belfiore, A., De Luca, A., Esposito, P., Wolter, A., Earnshaw, H. P., Walton, D. J., Roberts, T. P., Zampieri, L., Marelli, M., & Salvaterra, R. (2024). Skipping a beat: Discovery of persistent quasi-periodic oscillations associated with pulsed fraction drop of the spin signal in M51 ULX-7. *Astronomy & Astrophysics*, 689, A284. doi:10.1051/0004-6361/202450432.
10. **Amato, R.**, La Palombara, N., Imbrogno, M., Israel, G. L., Esposito, P., de Martino, D., Webb, N. A., & Iaria, R. (2024). Investigating the nature of the 2.4 h-period eclipsing cataclysmic variable W2 in 47 Tuc. *Astronomy & Astrophysics*, 689, A176. doi:10.1051/0004-6361/202450034.
11. Bachetti, M., Middleton, M. J., Pinto, C., Gúrpide, A., Walton, D. J., Brightman, M., Lehmer, B., Roberts, T. P., Vasilopoulos, G., Alford, J., **Amato, R.**, Ambrosi, E., Dai, L., Earnshaw, H. P., El Byad, H., García, J. A., Luca Israel, G., Jaodand, A., Madsen, K., Maitra, C., Mandel, S., Mori, K., Pintore, F., Ohsuga, K., Pilia, M., Stern, D., Younes, G., & Wolter, A. (2023). The high energy X-ray probe (HEX-P): Studying extreme accretion with ultraluminous X-ray sources. *Frontiers in Astronomy and Space Sciences*, 10, 1289432. doi:10.3389/fspas.2023.1289432.
12. Quintin, E., Webb, N. A., Guillot, S., Miniutti, G., Kammoun, E. S., Giustini, M., Arcodia, R., Soucail, G., Clerc, N., **Amato, R.**, & Markwardt, C. B. (2023). Tormund's return: Hints of quasi-periodic eruption features from a recent optical tidal disruption event. *Astronomy & Astrophysics*, 675, A152. doi:10.1051/0004-6361/202346440.
13. Diez, C. M., Grinberg, V., Fürst, F., El Mellah, I., Zhou, M., Santangelo, A., Martínez-Núñez, S., **Amato, R.**, Hell, N., & Kretschmar, P. (2023). Observing the onset of the accretion wake in Vela X-1. *Astronomy & Astrophysics*, 674, A147. doi:10.1051/0004-6361/202245708.

14. Barret, D. et al. (2023). The Athena X-ray Integral Field Unit: a consolidated design for the system requirement review of the preliminary definition phase. *Experimental Astronomy*, 55(2), 373-426. doi:10.1007/s10686-022-09880-7.
15. **Amato, R.**, Gúrpide, A., Webb, N. A., Godet, O., & Middleton, M. J. (2023). The ultraluminous X-ray source M 81 X-6: A weakly magnetised neutron star with a precessing accretion disc? *Astronomy & Astrophysics*, 669, A130. doi:10.1051/0004-6361/202244576; **A&A Highlight** [link here].
16. Ambrosi, E., D'Ai, A., Del Santo, M., Segreto, A., Ferrigno, C., **Amato, R.**, & Cusumano, G. (2022). Disc precession to explain the superorbital modulation of LMC X-4: Results from the Swift monitoring campaign. *Monthly Notices of the Royal Astronomical Society*, 512(3), 3422-3435. doi:10.1093/mnras/stac450.
17. **Amato, R.**, Diebold, S., Guzman, A., Perinati, E., Tenzer, C., Santangelo, A., & Mineo, T. (2021). Scattering efficiencies measurements of soft protons at grazing incidence from an Athena Silicon Pore Optics sample. *Experimental Astronomy*, 52(1-2), 109-123. doi:10.1007/s10686-021-09806-9.
18. Fioretti, V., Mineo, T., **Amato, R.**, Lotti, S., Macculi, C., Molendi, S., Gastaldello, F., Lanzuisi, G., Cappi, M., Dadina, M., & Etori, S. (2021). Design and characterization of a prototype proton response matrix for the XMM-Newton mission. *Optics for EUV, X-Ray, and Gamma-Ray Astronomy X* (Vol. 11822, p. 118221F). doi:10.1117/12.2594120.
19. Camilloni, F., Bianchi, S., **Amato, R.**, Ferland, G., & Grinberg, V. (2021). Cloudy in the Microcalorimeter Era: Improved energies for Si and S K fluorescence lines. *Research Notes of the American Astronomical Society*, 5(6), 149. doi:10.3847/2515-5172/ac0cff.
20. **Amato, R.**, Grinberg, V., Hell, N., Bianchi, S., Pinto, C., D'Ai, A., Del Santo, M., Mineo, T., & Santangelo, A. (2021). Looking through the photoionisation wake: Vela X–1 at $\varphi_{orb} \approx 0.75$ with Chandra/HETG. *Astronomy & Astrophysics*, 648, A105. doi:10.1051/0004-6361/202039125.
21. **Amato, R.**, Mineo, T., D'Ai, A., Diebold, S., Fioretti, V., Guzman, A., Lotti, S., Macculi, C., Molendi, S., Perinati, E., Tenzer, C., & Santangelo, A. (2020). Soft proton scattering at grazing incidence from X-ray mirrors: Analysis of experimental data in the framework of the non-elastic approximation. *Experimental Astronomy*, 49(3), 115-140. doi:10.1007/s10686-020-09657-w.
22. **Amato, R.**, D'Ai, A., Del Santo, M., de Martino, D., Marino, A., Di Salvo, T., Iaria, R., & Mineo, T. (2019). Search for multiwavelength emission from the binary millisecond pulsar PSR J1836-2354A in the globular cluster M22. *Monthly Notices of the Royal Astronomical Society*, 486(3), 3992-4000. doi:10.1093/mnras/stz1100.

Other works

2021–2023 4XMM-DR11, 4XMM-DR12, 4XMM-DR13 data releases of the *XMM-Newton serendipitous source catalogue* (see: <http://xmm-catalog.irap.omp.eu/>)