

Mark Armah

📍 Universidade do Vale do Paraíba, Av. Shishima Hifumi, 2911, CEP: 12244-000, São José dos Campos, SP, Brazil.

✉ mrkrmh@gmail.com

🌐 <http://lattes.cnpq.br/2291972087838064>

Professional Profile


👤 Postdoctoral researcher with over 4 years of research experience in the chemical composition of galaxies. My research focuses on active galactic nuclei (AGNs), the energetic hearts of galaxies powered by actively accreting supermassive black holes (SMBHs). I investigate the interplay between gas inflow, outflow, and consumption, which influences the physical properties of the gas. This impacts key aspects of galaxy evolution, such as the mass and metal content, metallicity and luminosity relations, among others.

Education

- Dec. 2020 – Jan. 2025 🎓 **PhD in Astrophysics**, Universidade Federal do Rio Grande do Sul (UFRGS), Brazil.
Thesis title: *Gas-phase metallicity in Seyfert galaxies*.
Supervisor: Prof. Rogério Riffel.
GRADE: A (Equivalent CGPA 4/4)
- Sept. 2018 – Oct. 2020 🎓 **MSc in Physics & Astronomy**, Universidade do Vale do Paraíba (UNIVAP), Brazil.
Thesis title: *Ne²⁺/H⁺ abundance of Seyfert 2s based on optical and IR emissions*.
Supervisor: Prof. Oli Luiz Dors Junior.
GRADE: 9.03/10 (Equivalent CGPA 3.67/4)
- Aug. 2009 – Jun. 2013 🎓 **BSc in Mechanical Engineering**, University of Mines and Technology (UMaT), Ghana.
Thesis title: *Design of Piezoelectric Transducer for harvesting vibrational energy*.
Supervisor: Dr. E. M. Seckley.
CWA: 79.22/100 (Equivalent CGPA 3.48/4)


Research Appointments

FAPESP Postdoctoral Researcher

Feb. 2025 – Jan. 2027  *Universidade do Vale do Paraíba (UNIVAP), São José dos Campos, SP, Brazil*






- Developed custom, object-oriented Python pipelines to process, interpolate, and analyze extensive multi-dimensional spectroscopic datasets.
- Constructed comprehensive `CLOUDY` photoionization model grids to map the physical conditions of narrow-line regions in AGNs, explicitly parameterizing models by intrinsic 2-10 keV X-ray luminosity.
- Derived new semi-empirical metallicity calibrations (N2, O3N2, N2O2, and N2S2 diagnostics) that successfully decouple true gas-phase chemical abundances from structural nebular variations driven by the AGN radiation field.
- Analyzed complex kinematic and emission-line profiles to identify and correct systematic biases in standard strong-line diagnostics, laying the groundwork for analyzing high-resolution spectra from next-generation observatories.

Research Metrics




 12 total papers. 4 first-author papers. 1 third-author and 8 nth-author papers. First author citations: 41, number of self-citations: 51, total citations: 313, h-index: 9 (Source - NASA/ADS, Date: 14th April 2026). Find a full list of my publications at any of the following profiles: [ADS Library](#), [Google Scholar](#), [ResearchGate](#), [Lattes](#) or [ORCID](#). Otherwise, see my full list of publications under [Refereed Publications](#) below.

Refereed Publications

Lead author

-  **Armah, Mark**, Dors, O. L., Riffel, R., Cardaci, M. V., Hägele, G. F., Riffel, R. A., & Vílchez, J. M. (2026). Identifying AGNs from X-ray detections—II: Metallicity calibrations for the N₂O₂ and N₂S₂ diagnostics [under colab review]. *MNRAS*, 1–16.
-  **Armah, M.**, Dors, O. L., Riffel, R., Cardaci, M. V., Hägele, G. F., Riffel, R. A., & Vílchez, J. M. (2026). Identifying AGNs from X-ray detections-I: Metallicity calibrations in AGNs with X-ray luminosity as the primary input parameter. *MNRAS*.
<https://doi.org/10.1093/mnras/stag560>
-  **Armah, Mark**, Riffel, R., Dahmer-Hahn, L. G., Davies, R. I., Dors, O. L., Kakkad, D., Riffel, R. A., Rodríguez-Ardila, A., Ruschel-Dutra, D., & Storchi-Bergmann, T. (2024). Spatially resolved gas-phase metallicity in Seyfert galaxies. *MNRAS*, 534(3), 2723–2757.
<https://doi.org/10.1093/mnras/stae2263>
-  **Armah, Mark**, Riffel, R., Dors, O. L., Oh, K., Koss, M. J., Ricci, C., Trakhtenbrot, B., Valerdi, M., Riffel, R. A., & Krabbe, A. C. (2023). Oxygen abundances in the narrow line regions of Seyfert galaxies and the metallicity-luminosity relation. *MNRAS*, 520(2), 1687–1703. <https://doi.org/10.1093/mnras/stad217>
-  **Armah, Mark**, Dors, O. L., Aydar, C. P., Cardaci, M. V., Hägele, G. F., Feltre, A., Riffel, R., Riffel, R. A., & Krabbe, A. C. (2021). Chemical abundances in Seyfert galaxies - VII. Direct abundance determination of neon based on optical and infrared emission lines. *MNRAS*, 508(1), 371–391. <https://doi.org/10.1093/mnras/stab2610>

Co-author

-  Dors, O. L., **Armah, M.**, Cardaci, M. V., Hägele, G. F., Santos, P. C., Riffel, R. A., Cresci, G., Riffel, R., Marinho, L. N., Ji, X., Isobe, Y., Maiolino, R., Marconi, A., Feltre, A., Sanders, R. L., Morais, I. N., & Almeida, G. C. (2026). Cosmic evolution of the helium and oxygen abundances in type 2 Active Galactic Nuclei: Helium-loud AGNs [submitted]. *MNRAS*, 1–12.
-  Marinho, L. N., Riffel, R., Dahmer-Hahn, L. G., Kakkad, D., Vazdekis, A., Wylezalek, D., **Armah, Mark**, Koss, M., Riffel, R. A., Schnorr-Muller, A., Ricci, C., Caglar, T., & Dors Junior, O. (2026). The Rejuvenation of Seyfert Centres: The role of stellar recycled gas in feeding the AGN [submitted]. *MNRAS*, 1–33.
-  Flury, S. R., Dors, O. L., Riffel, R. A., Arellano-Córdova, K. Z., **Armah, M.**, Hägele, G. F., Cardaci, M. V., & Zinchenko, I. A. (2026). An Empirical Temperature Relation for Chemical Abundances in AGN [submitted]. *MNRAS*, 1–16.

-  Dors, O. L., Oliveira, C. B., Cardaci, M. V., Hägele, G. F., **Armah, Mark**, Riffel, R. A., Vieira, L. R., Almeida, G. C., Morais, I. N., & Santos, P. C. (2025). Metallicity of Active Galactic Nuclei from ultraviolet and optical emission lines - II. Revisiting the C43 metallicity calibration and its implications. *MNRAS*, 542(4), 3181–3197. <https://doi.org/10.1093/mnras/staf1407>
-  Dors, O. L., Valerdi, M., Riffel, R. A., Riffel, R., Cardaci, M. V., Hägele, G. F., **Armah, Mark**, Revalski, M., Flury, S. R., Freitas-Lemes, P., Amôres, E. B., Krabbe, A. C., Binette, L., Feltre, A., & Storchi-Bergmann, T. (2023). Chemical abundances in Seyfert galaxies - X. Sulphur abundance estimates. *MNRAS*, 521(2), 1969–1987. <https://doi.org/10.1093/mnras/stad635>
-  Dors, O. L., Valerdi, M., Freitas-Lemes, P., Krabbe, A. C., Riffel, R. A., Amôres, E. B., Riffel, R., **Armah, M.**, Monteiro, A. F., & Oliveira, C. B. (2022). Chemical abundances in Seyfert galaxies - IX. Helium abundance estimates. *MNRAS*, 514(4), 5506–5527. <https://doi.org/10.1093/mnras/stac1722>
-  do Nascimento, J. C., Dors, O. L., Storchi-Bergmann, T., Mallmann, N. D., Riffel, R., Ilha, G. S., Riffel, R. A., Rembold, S. B., Deconto-Machado, A., da Costa, L. N., & **Armah, Mark**. (2022). Gas-phase metallicity determinations in nearby AGNs with SDSS-IV MaNGA: evidence of metal-poor accretion. *MNRAS*, 513(1), 807–821. <https://doi.org/10.1093/mnras/stac771>
-  Riffel, R. A., Dors, O. L., **Armah, M.**, Storchi-Bergmann, T., Feltre, A., Hägele, G. F., Cardaci, M. V., Ruschel-Dutra, D., Krabbe, A. C., Pérez-Montero, E., Zakamska, N. L., & Freitas, I. C. (2021). Chemical abundances in Seyfert galaxies - V. The discovery of shocked emission outside the AGN ionization axis. *MNRAS*, 501(1), L54–L59. <https://doi.org/10.1093/mnrasl/slaa194>
-  Dors, O. L., Maiolino, R., Cardaci, M. V., Hägele, G. F., Krabbe, A. C., Pérez-Montero, E., & **Armah, M.** (2020). Chemical abundances of Seyfert 2 AGNs - III. Reducing the oxygen abundance discrepancy. *MNRAS*, 496(3), 3209–3221. <https://doi.org/10.1093/mnras/staa1781>
-  Carvalho, S. P., Dors, O. L., Cardaci, M. V., Hägele, G. F., Krabbe, A. C., Pérez-Montero, E., Monteiro, A. F., **Armah, M.** & Freitas-Lemes, P. (2020). Chemical abundances of Seyfert 2 AGNs - II. N2 metallicity calibration based on SDSS. *MNRAS*, 492(4), 5675–5683. <https://doi.org/10.1093/mnras/staa193>
-  Dors, O. L., Freitas-Lemes, P., Amôres, E. B., Pérez-Montero, E., Cardaci, M. V., Hägele, G. F., **Armah, M.**, Krabbe, A. C., & Faúndez-Abans, M. (2020). Chemical abundances of Seyfert 2 AGNs - I. Comparing oxygen abundances from distinct methods using SDSS. *MNRAS*, 492(1), 468–479. <https://doi.org/10.1093/mnras/stz3492>

Awards & Scholarships

- May - June 2025 🏆 Research Collaboration Grant, ESTALLIDOS Research Group, IAA-CSIC, Spain (Full coverage of accommodation expenses for a scientific stay).
- Dec. 2020 - Jan. 2025 🏆 CAPES PhD Scholarship (R\$131.600,00).
- Sept. 2023 🏆 *Young Researcher Travel Support*, for AGN Winds on the Chesapeake (\$1,315.00 USD).
- Jul. 2023 🏆 Fermi Summer School Travel Grant (\$2,673.94 USD).
- Sept. 2018 - Oct. 2020 🏆 CAPES MSc Scholarship (R\$70.200,00).

Research Visits

- May 18-June 3, 2025 ✈️ **Visiting Researcher**, Institute of Astrophysics of Andalusia (IAA-CSIC), Granada, Spain.
- ✈️ Invited for a scientific collaboration with the ESTALLIDOS Research Group to advance the investigation of metallicity and chemical evolution of galaxies.


Invited Talks & Conference Presentations

- May 2025 🎤 **2nd Severo Ochoa Advanced School on Galaxy Evolution**, Granada, Presentation: “*Gas-phase metallicity and AGN host property relations: Implications for galaxy evolution.*”
- 6-10 May, 2024 🎤 **Chemical abundances in gaseous nebulae**, São José dos Campos, São Paulo - Brazil. Invited workshop, CHEMICAL ABUNDANCES IN GASEOUS NEBULAE: “*Multi-Scale Metals Throughout the Universe.*”
- 11-16 June, 2023 🎤 **AGN Winds on the Chesapeake**, Easton, Maryland - USA. Invited conference, “*Oxygen abundance in the NLR of Seyfert galaxy and the metallicity-luminosity relation*”.
- May 30 - June 9, 2023 🎤 **Fermi Summer School**, Lewes, Delaware - USA. “*Oxygen abundance in the NLR of Seyfert galaxies.*”
- 24-28 May, 2021 🎤 **Chemical abundances in gaseous nebulae**, São José dos Campos, São Paulo - Brazil, online. Invited workshop, “*Open problems in nebular astrophysics.*”
- 11-14 March, 2019 🎤 **Chemical abundances in gaseous nebulae**, São José dos Campos, São Paulo - Brazil. Participant, “*From the milky way to the early universe.*”


Computational & Data Analysis Skills

Programming & Scripting:	</> Python (Data Analysis, Visualization, Object-Oriented Programming), MySQL
Astrophysical Software & Modeling	</> CLOUDY Photoionization Code, pPXF (Penalized Pixel-Fitting) STARLIGHT, IFSCUBE, PYRAF/IRAF
Publishing & Operating Systems	</> L ^A T _E X, Linux/Unix, macOS, Windows
Languages	</> Akan (native), English (proficient), Portuguese (intermediate)

Teaching & Mentoring Experience

Nov. 2022 - Apr 2023  **Teaching Assistant**, for *Galactic & Extragalactic Astronomy, and Cosmology* at Universidade Federal do Rio Grande do Sul, Brazil.

- Facilitated an inclusive and interactive learning environment by preparing and presenting accessible lectures, tutorials, and seminars on complex astrophysical concepts.
- Mentored undergraduate students through dedicated office hours and one-on-one discussions, assisting them in developing critical problem-solving skills for homework and exams.
- Assisted in developing equitable evaluation materials and tracking student progress to ensure all students were supported in achieving learning objectives.

Sept. 2019 - Mar 2020  **Teaching Assistant**, for *Solid Mechanics* at Universidade do Vale do Paraíba, Brazil.

- Designed and delivered clear, engaging, and hands-on tutorials tailored to diverse learning styles.
- Provided targeted academic support to students with specific learning requirements, including non-native speakers (English as a second language), ensuring equitable access to course material.
- Created and graded assignments and midterm exams, providing constructive feedback to guide student growth.

Additional Professional Experience

- Jun. 2016 – Aug. 2018  **Operations Supervisor**, Zen Petroleum Limited, Tarkwa, Ghana.
- Managed daily operations, client data reconciliation, and statistical reporting utilizing Fuel Management Systems and national regulatory portals.
- Jan. 2016 – Jun. 2016  **Branch Manager**, FEKWON College, Ghana.
- Directed campus administrative operations, including financial balancing, periodic reporting, and organizing staff training and development courses.
- Sept. 2013 - Sept. 2014  **Sales Engineer**, Sandvik Mining and Construction Ghana Ltd.
- Designed and executed technical lifespan trials and comparative data studies, presenting analytical findings to international manufacturing departments to drive product optimization.
- Mar 2011 – Jul 2011  **Mining Maintenance Mechanics Intern** at Adamus Resources Limited (Nzema Gold Mine, Nkroful, Ghana).
- Analyzed equipment data to develop and schedule preventative maintenance plans while ensuring strict compliance with safety regulations.

Last updated: 14th April 2026