

PERSONAL AND
CONTACT
INFORMATION

Name: Hector Okada da Silva
Citizenship: Brazilian

University of Illinois Urbana-Champaign
Department of Physics, Loomis Laboratory,
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RESEARCH
INTERESTS

Astrophysical aspects of relativistic gravity (general relativity and modifications thereof). Black-hole and stellar perturbation theory. Strong-field tests of gravity, and gravitational waveform modeling. Neutron star astrophysics and equation of state.

EMPLOYMENT

University of Illinois Urbana-Champaign, Urbana, IL, USA

Department of Physics
December 2024

- Position: Tenure-track Assistant Professor

Max Planck Institute for Gravitational Physics (Albert Einstein Institute), Potsdam, Germany

Department of Astrophysical and Cosmological Relativity
November 2020 – November 2024

- Position: Junior (2020 – 2023), then Senior (2023 – 2024) Scientist / Leibniz fellow
- Supervisor: [Alessandra Buonanno](#)

University of Illinois Urbana-Champaign, Urbana, IL, USA

Department of Physics
August 2019 – October 2020

- Position: Post-doctoral researcher
- Supervisor: [Nicolás Yunes](#)

Montana State University, Bozeman, MT, USA

Department of Physics
August 2017 – August 2019

- Position: Post-doctoral researcher
- Supervisor: [Nicolás Yunes](#)

EDUCATION

University Mississippi, Oxford, MS, USA

PhD., Department of Physics and Astronomy, May 2017

- Title: *Compact objects in relativistic theories of gravity*
- Supervisor: [Emanuele Berti](#)

Federal University of Pará, Belém, PA, Brazil

M.Sc., Graduate Program in Physics, February 2011

- Title: *Dynamical Casimir effect in 1+1 dimensions*
- Supervisors: Danilo T. Alves and Carlos Farina

B.Sc., Department of Physics, December 2008

- Title: *Exact solution for the energy density inside a non-stationary cavity with an arbitrary initial field state and applications*
- Supervisor: Danilo T. Alves

AWARDS, HONORS &
SCHOLARSHIPS

- [1] *The 2017 GWIC-Braccini Thesis Prize*, Gravitational Wave International Committee (2019).
- [2] *Dissertation Fellowship* – Spring 2017, University of Mississippi (2016).
- [3] *Graduate Achievement Award*, University of Mississippi (2016).
- [4] *Elected member of the Sigma Pi Sigma*, the Physics Honor Society (2016).
- [5] *The Blue Apple Award* [For best student talk at the 8th Gulf Coast Gravity Meeting, University of Florida], *American Physical Society Topical Group in Gravitation* (2015).
- [6] Summer Research Assistantship, Graduate School, University of Mississippi (2015).
- [7] University of Mississippi, Department of Physics and Astronomy, *Zdravko Stipcevic Honors Fellowship* (2012 – 2015).
- [8] National Council for Scientific and Technological Development (CNPq) Scholarship, (2009 – 2011).
- [9] Foundation for Research Support of the State of Pará (FAPESPA) Scholarship, (2008 – 2009).
- [10] National Council for Scientific and Technological Development (CNPq) Scholarship, (2006 – 2008).

RESEARCH GRANTS

- [1] Fund from the [Gravity Theory Trust](#), to organize the workshop “EFTs, Gravity, and Fluid Dynamics: Progress, Challenges, and Emerging Opportunities” between December 16th to 18th, 2024. Total value of \$15,000 USD.
- [2] Fund from the [Gravity Theory Trust](#), to organize the workshop “Connecting the dots: Toward inspiral-merger-ringdown gravitational waveforms beyond general relativity” between June 14th to 16th, 2023. Total value of \$15,000 USD.
- [3] co-PI of the 2021 *Illinois Blue Waters allocation* project entitled “*Strong field tests of gravity: numerical relativity in quadratic gravity*”. Total of 689,000 node-hours (with an estimated value of \$427,387 USD). (January 2021 to December 2021).
- [4] *NAOJ Visiting Joint Research* travel grant, National Astronomical Observatory of Japan (September 21, 2018 to October, 21 2018).

SCIENTIFIC
COLLABORATIONS

- Member of the [LIGO Scientific Collaboration](#) from 09/2022 to 12/2024.
I contribute to the AEI LSC group’s work in tests of general relativity with gravitational-wave observations, in particular with the “pSEOB” pipeline.
- Member of the [Einstein Telescope Observation Science Board](#) since 07/2022.
I contribute to the ET OBS Division 8 – Waveforms. I am the coordinator of the section “Waveforms in alternative theories of gravity” for the Einstein Telescope’s Blue Book, that will cover the observatory’s science case.

As of December 2024, **I have a total of 46 published short-author** research papers, **1** topical review, **3** papers in conference proceedings, **2** two book chapters, and **2** manuscripts currently under review. This includes **6** papers in the *Physical Review Letters*, **1** in *The Astrophysical Journal Letters*, and **1** invited article for the *Reviews of Modern Physics*. In total, my work has gathered a total of 4,645 citations, and I have a *h*-index of 29 according to the INSPIRE database. For the most up-to-date publication record see my profile in INSPIRE [<https://inspirehep.net/authors/1064872>].

[1] D. T. Alves, E. R. Granhen, H. O. Silva, and M. G. Lima, *Quantum radiation force on the moving mirror of a cavity, with Dirichlet and Neumann boundary conditions for a vacuum, finite temperature, and a coherent state*, *Phys. Rev. D* **81** 025016 (2010).

[2] D. T. Alves, E. R. Granhen, H. O. Silva, and M. G. Lima, *Exact behavior of the energy density inside an one-dimensional oscillating cavity with a thermal state*, *Phys. Lett. A* **374** 3899-3907 (2010) [[arXiv:1002.2238](https://arxiv.org/abs/1002.2238)].

[3] H. O. Silva and C. Farina, *Simple model for the dynamical Casimir effect for a static mirror with time-dependent properties*, *Phys. Rev. D* **84** 045003 (2011) [[arXiv:1102.2238](https://arxiv.org/abs/1102.2238)].

[4] A. L. C. Rego, H. O. Silva, D. T. Alves, and C. Farina, *New signatures of the dynamical Casimir effect in a superconducting circuit*, *Phys. Rev. D* **90** 025003 (2014) [[arXiv:1405.3720](https://arxiv.org/abs/1405.3720)].

[5] H. O. Silva, H. Sotani, E. Berti, and M. Horbatsch, *Torsional oscillations of neutron stars in scalar-tensor theory of gravity*, *Phys. Rev. D* **90** 124044 (2014) [[arXiv:1410.2511](https://arxiv.org/abs/1410.2511)].

[6] H. O. Silva, C. F. B. Macedo, E. Berti, and L. C. B. Crispino, *Slowly rotating anisotropic neutron stars in general relativity and scalar-tensor theory*, *Class. Quantum Grav.* **32** 145008 (2015) [[arXiv:1411.6286](https://arxiv.org/abs/1411.6286)], (Chosen as **IOPSELECT**)

[7] K. Glampedakis, G. Pappas, H. O. Silva, and E. Berti, *Post-Tolman-Oppenheimer-Volkoff formalism for relativistic stars*, *Phys. Rev. D* **92** 024056 (2015) [[arXiv:1504.02455](https://arxiv.org/abs/1504.02455)].

[8] M. Horbatsch, H. O. Silva, D. Gerosa, P. Pani, E. Berti, L. Gualtieri, and U. Sperhake, *Tensor-multi-scalar theories: relativistic stars and 3+1 decomposition*, *Class. Quantum Grav.* **32** 204001 (2015) [[arXiv:1505.07462](https://arxiv.org/abs/1505.07462)], (Chosen as **IOPSELECT**)

[9] A. Maselli, H. O. Silva, M. Minamitsuji, and E. Berti, *Slowly rotating black hole solutions in Horndeski gravity*, *Phys. Rev. D* **92** 104049 (2015) [[arXiv:1508.03044](https://arxiv.org/abs/1508.03044)].

[10] H. O. Silva, H. Sotani, and E. Berti, *Low-mass neutron stars: universal relations, the nuclear symmetry energy and gravitational radiation*, *MNRAS* **459** 4378 (2016) [[arXiv:1601.03407](https://arxiv.org/abs/1601.03407)].

[11] A. Maselli, H. O. Silva, M. Minamitsuji, and E. Berti, *Neutron stars in Horndeski gravity*, *Phys. Rev. D* **93** 124056 (2016) [[arXiv:1603.04876](https://arxiv.org/abs/1603.04876)].

[12] M. Minamitsuji and H. O. Silva, *Relativistic stars in scalar-tensor theories with disformal coupling*, *Phys. Rev. D* **93** 124041 (2016) [[arXiv:1604.07742](https://arxiv.org/abs/1604.07742)].

[13] K. Glampedakis, G. Pappas, H. O. Silva, and E. Berti, *Astrophysical application of the Post-Tolman-Oppenheimer-Volkoff formalism*, *Phys. Rev. D* **94** 044030 (2016) [[arXiv:1606.05106](https://arxiv.org/abs/1606.05106)] (Featured as **EDITORS'S SUGGESTION**).

[14] K. Glampedakis, G. Pappas, H. O. Silva, and E. Berti, *Post-Kerr black hole spectroscopy*, *Phys. Rev. D* **96** 064054 (2017) [[arXiv:1706.07658](https://arxiv.org/abs/1706.07658)].

[15] H. O. Silva and N. Yunes, *I-Love-Q to the extreme*, *Class. Quantum Grav.* **35** 015005 (2017) [[arXiv:1710.00919](https://arxiv.org/abs/1710.00919)].

[16] J. Alsing, H. O. Silva, and E. Berti, *Evidence for a maximum mass cut-off in the neutron star mass distribution and constraints on the equation of state*, *MNRAS* **478** 1377 (2018) [[arXiv:1709.07889](https://arxiv.org/abs/1709.07889)].

- [17] H. O. Silva, J. Sakstein, L. Gualtieri, T. P. Sotiriou, and E. Berti, *Spontaneous scalarization of black holes and compact stars from a Gauss-Bonnet coupling*, *Phys. Rev. Lett.* **120** 131104 (2018) [arXiv:1711.02080]
- [18] H. O. Silva and N. Yunes, *Neutron star pulse profiles in scalar-tensor theories of gravity*, *Phys. Rev. D* **99** 044034 (2019) [arXiv:1808.04391]
- [19] H. O. Silva, C. F. B. Macedo, T. P. Sotiriou, L. Gualtieri, J. Sakstein, and E. Berti, *Stability of scalarized black hole solutions in scalar-Gauss-Bonnet gravity*, *Phys. Rev. D* **99** 064011 (2019) [arXiv:1812.05590]
- [20] C. F. B. Macedo, J. Sakstein, E. Berti, L. Gualtieri, H. O. Silva, and T. P. Sotiriou, *Self-interactions and Spontaneous Black Hole Scalarization*, *Phys. Rev. D* **99**, 104041 (2019) [arXiv:1903.06784]
- [21] H. O. Silva and N. Yunes, *Neutron star x-ray burst oscillations as extreme gravity probes*, *Class. Quantum Grav.* **36**, 17LT01 (2019) [arXiv:1902.10269]
- [22] H. Sotani, H. O. Silva, and G. Pappas, *Finite size effects on the light curves of slowly-rotating neutron stars*, *Phys. Rev. D* **100**, 043006 (2019) [arXiv:1905.07668]
- [23] A. Saffer, H. O. Silva, and N. Yunes, *The exterior spacetime of relativistic stars in scalar-Gauss-Bonnet gravity*, *Phys. Rev. D* **100**, 044030 (2019) [arXiv:1903.07779]
- [24] K. Glampedakis and H. O. Silva, *Eikonal quasinormal modes of black holes beyond general relativity*, *Phys. Rev. D* **100**, 044040 (2019) [arXiv:1906.05455]
- [25] H. O. Silva and N. Yunes, *More than the sum of its parts: combining parameterized tests of extreme gravity*, *Phys. Rev. D* **100**, 084034 (2019) [arXiv:1906.00485]
- [26] R. Nair, S. Perkins, H. O. Silva, and N. Yunes, *Fundamental physics implications on higher-curvature theories from the binary black hole signals in the LIGO-Virgo Catalog GWTC-1*, *Phys. Rev. Lett.* **123**, 191101 (2019), *ibid.* **124**, 169904(E) (2020) [arXiv:1905.00870]
- [27] H. O. Silva and M. Minamitsuji, *Cosmological attractors to general relativity and spontaneous scalarization with disformal coupling*, *Phys. Rev. D* **100**, 104012 (2019) [arXiv:1909.11756]
- [28] H. O. Silva and K. Glampedakis, *Eikonal quasinormal modes of black holes beyond general relativity II: generalized scalar-tensor perturbations*, *Phys. Rev. D* **101**, 044051 (2020) [arXiv:1912.09286]
- [29] C. A. R. Herdeiro, E. Radu, H. O. Silva, T. P. Sotiriou, and N. Yunes, *Spin-induced scalarized black holes*, *Phys. Rev. Lett.* **126**, 011103 (2021) [arXiv:2009.03904]
- [30] H. O. Silva, G. Pappas, N. Yunes, and K. Yagi, *The surface of rapidly-rotating neutron stars: implications to neutron star parameter estimation*, *Phys. Rev. D* **103**, 063038 (2021) [arXiv:2008.05565]
- [31] A. Miguel Holgado, H. O. Silva, P. M. Ricker, and N. Yunes, *The role of strong gravity and the nuclear equation of state on neutron-star common-envelope accretion*, *Astrophys. J. Lett.* **901**, L22 (2021) [arXiv:2101.08267]
- [32] H. O. Silva, A. Miguel Holgado, A. Cárdenas-Avendaño, and N. Yunes, *Astrophysical and theoretical physics implications from multimessenger neutron star observations*, *Phys. Rev. Lett.* **126**, 181101 (2021) [arXiv:2004.01253] (Featured as **EDITORS'S SUGGESTION** and on **Physics.**)
- [33] Y. Xie, J. Zhang, H. O. Silva, C. de Rham, H. Witek, and N. Yunes, *A square peg in a circular hole: choosing the right ansatz for isolated black holes in generic gravitational theories*, *Phys. Rev. Lett.* **126**, 241104 (2021) [arXiv:2103.03925]
- [34] H. O. Silva, H. Witek, M. Elley, and N. Yunes, *Dynamical descalarization in binary black hole mergers*, *Phys. Rev. Lett.* **127**, 031101 (2021) [arXiv:2012.10436]

- [35] S. E. Perkins, R. Nair, H. O. Silva, and N. Yunes, *Improved gravitational-wave constraints on higher-order curvature theories of gravity*, *Phys. Rev. D* **104**, 024060 (2021) [arXiv:2104.11189]
- [36] A. Bryant, H. O. Silva, K. Yagi, and K. Glampedakis, *Eikonal quasinormal modes of black holes beyond general relativity III: scalar Gauss-Bonnet gravity*, *Phys. Rev. D* **104**, 044051 (2021) [arXiv:2106.09657]
- [37] H. O. Silva, A. Coates, F. M. Ramazanoğlu, and T. P. Sotiriou *Ghost of vector fields in compact stars*, *Phys. Rev. D* **105**, 024046 (2022) [arXiv:2110.04594]
- [38] P. Wagle, N. Yunes, and H. O. Silva, *Quasinormal modes of slowly-rotating black holes in dynamical Chern-Simons gravity*, *Phys. Rev. D* **105**, 124003 (2022) [arXiv:2103.09913]
- [39] F.-L. Julié, H. O. Silva, E. Berti, and N. Yunes, *Black hole sensitivities in Einstein-scalar-Gauss-Bonnet gravity*, *Phys. Rev. D* **105**, 124031 (2022) [arXiv:2202.01329]
- [40] M. Elley, H. O. Silva, H. Witek, and N. Yunes, *Spin-induced dynamical scalarization, de-scalarization and stealthness in scalar-Gauss-Bonnet gravity during black hole coalescence*, *Phys. Rev. D* **106**, 044018 (2022) [arXiv:2205.06240]
- [41] H. O. Silva, A. Ghosh, and A. Buonanno, *Black-hole ringdown as a probe of higher-curvature gravity theories*, *Phys. Rev. D* **107**, 044030 (2023) [arXiv:2205.05132]
- [42] E. Maggio, H. O. Silva, A. Buonanno, and A. Ghosh, *Tests of general relativity in the nonlinear regime: a parametrized plunge-merger-ringdown gravitational waveform model*, *Phys. Rev. D* **108**, 024043 (2023) [arXiv:2212.09655]
- [43] M. K. Mandal, P. Mastrolia, H. O. Silva, R. Patil, and J. Steinhoff, *Gravitoelectric dynamical tides at second post-Newtonian order*, *J. High Energ. Phys.* **2023**, 67 (2023) [arXiv:2304.02030]
- [44] H. O. Silva, G. Tambalo, K. Glampedakis, and K. Yagi, *Gravitational radiation from a particle plunging into a Schwarzschild black hole: frequency-domain and semirelativistic analyses*, *Phys. Rev. D* **109**, 024036 (2024) [arXiv:2308.14823]
- [45] M. K. Mandal, P. Mastrolia, H. O. Silva, R. Patil, and J. Steinhoff, *Renormalizing Love: tidal effects at the third post-Newtonian order*, *J. High Energ. Phys.* **2024**, 188 (2024) [arXiv:2308.01865]
- [46] H. O. Silva, G. Tambalo, K. Glampedakis, K. Yagi, and J. Steinhoff, *Quasinormal modes and their excitation beyond general relativity* *Phys. Rev. D* **110**, 024042 (2024) [arXiv:2404.11110]
- REVIEW PAPERS [47] E. Berti, [47 authors], H. O. Silva, [5 authors], *Testing general relativity with present and future astrophysical observations*, *Class. Quantum Grav.* **32** 243001 (2015) [arXiv:1501.07274].
- [48] D. D. Doneva, F. M. Ramazanoğlu, H. O. Silva, T. P. Sotiriou, and S. S. Yazadjiev, *Spontaneous scalarization*, *Rev. Mod. Phys.* **96**, 015004 (2024) [arXiv:2211.01766]
- PUBLICATIONS ACCEPTED OR IN REVIEW [49] A. Eichhorn, Pedro G. S. Fernandes, A. Held, and H. O. Silva, *Breaking black-hole uniqueness at supermassive scales* [arXiv:2312.11430]
- [50] J. Streibert, H. O. Silva, and M. Zumalacárregui, *Gravitational-wave lensing in Einstein-aether theory* [arXiv:2404.07782]
- PUBLICATIONS IN CONFERENCE PROCEEDINGS [51] D. T. Alves, E. R. Granhen, M. G. Lima, H. O. Silva and A. R. L. Rego, *Time evolution of the energy density inside a one-dimensional non-static cavity with a vacuum, thermal and a coherent state*, *J. Phys.: Conf. Ser.* **161** 012032 (2009) [arXiv:0903.1305] (Contribution to the proceedings of the 60 years of the Casimir effect conference).

[52] C. Farina, H. O. Silva, A. L. C. Rego and D. T. Alves, *Time-dependent Robin boundary conditions in the dynamical Casimir effect*, *Int. J. Mod. Phys. Conf. Ser.* **14** 306 (2012) [arXiv:1201.3846] (Contribution to the proceedings of the *10th Quantum Field Theory Under the Influence of External Conditions* conference).

[53] H. O. Silva, A. Maselli, M. Minamitsuji and E. Berti, *Compact objects in Horndeski gravity*, *Int. J. Mod. Phys. D* **25** 1641006 (2016) [arXiv:1602.05997] (Contribution to the proceedings of the *3rd Amazonian Symposium on Physics and 5th NRHEP Network Meeting*).

BOOK CHAPTERS

[1] A. L. C. Rego, D. T. Alves, E. R. Granhen, H. O. Silva, M. G. Lima and W. P. Pires, *The Dynamical Casimir Effect*, in *Trends in Physics - Festschrift in homage to Prof. José Maria Filardo Bassalo*. Eds. M. S. D. Cattani, L. C. B. Crispino, M. O. C. Gomes and A. F. S. Santoro, (Editora Livraria da Física, São Paulo, 2009).

[2] H. O. Silva, *Neutron stars as extreme gravity probes*, in *Recent Progress on Gravity Tests*. Eds. C. Bambi and A. Cárdenas-Avendaño, (Springer, Singapore, 2024). [arXiv:2407.17578]

CODE CONTRIBUTIONS

[1] H. Witek et al., *Canuda: a public numerical relativity library to probe fundamental physics*, [10.5281/zenodo.5520862](https://doi.org/10.5281/zenodo.5520862)

I have contributed to the `canuda_edgb_dec` thorn used for numerical relativity simulations beyond-general relativity with the Einstein Toolkit.

MEDIA & PRESS

Some of my work has been featured in media and press:

[1] Elke Müller, “Exploring gravitational waveforms beyond general relativity”
Story on the “Connecting the dots” workshop, June 8, 2023.

[2] Keith Cooper, “General relativity passes crucial neutron-star test”
Story on the paper [32], May 12, 2021.

[3] Monisha Raviseti, “General relativity passes yet another test, this time facing off with neutron stars”
Story in The Academic Times on the paper [32], May 6, 2021.

[4] Eric Simon, episode 1173 of the podcast “Ça Se Passe Là-Haut”, “La Relativité Générale testée en champ fort grâce à la relation I-Love-Q des étoiles à neutrons”
Story on the paper [32], May 4, 2021.

[5] Jessica Raley, “ICASU researchers test general relativity using NICER and LIGO/Virgo data”
Story on the paper [32], May 3, 2021.

[6] Daniela Doneva, “Compiling Messages from Neutron Stars”
Story on American Physical Society’s *Physics* magazine on the paper [32], May 3, 2021.

[7] Remya Nair, “Testing Einstein when gravity waves”
Story on the paper [26], July 2, 2020.

[8] Edwin B. Smith, “Physics Alumnus Wins International Award for Gravitational Wave Thesis”
Story on the 2017 GWIC-Braccini Thesis Award, June 25, 2019.

[9] Claire Fullerton, “Gravity and scalar fields: live long and prosper?”
Invited contribution to *CQG+* based on publication [8], October 14, 2015.

[10] Rafael Rocha, “Pesquisa em Física ganha destaque em revista internacional”
Interview for the Federal University of Pará website on publication [6], September, 2015.

[11] Claire Fullerton, “Spontaneous scalarization: dead or alive?”
Invited contribution to *CQG+* based on publication [6], September 23, 2015.

CONFERENCE,
INVITED TALKS AND
COLLOQUIUM
PRESENTATIONS

- [1] *Strong-field experimental relativity*, [invited](#) lecture in the International Max Planck Research School on Gravitational-Wave Astronomy Lecture Week, Wanzleben, Germany. (16/09/2024).
- [2] *Quasinormal modes and their excitation beyond general relativity*, [invited](#) talk in the workshop “New Frontiers in Strong Gravity”, Benasque, Spain. (12/07/2024).
- [3] *Quasinormal modes and their excitation beyond general relativity*, [invited](#) virtual talk in the Gravitational Physics Seminar, organized by the Indian Institute of Technology Gandhinagar and the Indian Association of the Cultivation of Science. (03/06/2024).
- [4] *Quasinormal modes and their excitation beyond general relativity*, [invited](#) talk in the Department of Computational Relativistic Astrophysics, Max Planck Institute for Gravitational Physics, Potsdam, Germany (28/05/2024).
- [5] *Testing general relativity with binary black holes*, [invited](#) talk in the Department of Quantum Gravity and Unified Theories, Max Planck Institute for Gravitational Physics, Potsdam, Germany (04/04/2024).
- [6] *Black hole perturbations and phase-amplitude methods*, [invited](#) talk in the Universitat de les Illes Balears, Palma, Spain. (18/12/2023).
- [7] *Testing strong-field gravity with multimessenger observations of neutron stars*, [invited](#) talk in the conference “Gravity Shape Pisa: New Frontiers in Gravity Phenomenology”, Pisa, Italy (26/10/2023).
- [8] *Black hole scalarization*, [invited](#) talk at the I GraviTas Workshop on Strong Tests, Salinópolis, Brazil (29/08/2023).
- [9] *Black hole scalarization*, [invited](#) talk at the 41st Samahang Pisika ng Pilipinas Physics Conference and Annual Meeting, Del Carmo, Siargao Island, Surigao Del Norte, Philippines (19/07/2023).
- [10] *Black hole scalarization: lessons from numerical relativity*, [invited](#) talk at European Einstein Toolkit Meeting, University of Aveiro, Aveiro, Portugal (22/06/2023).
- [11] *Testing general relativity in the nonlinear regime with black-hole binaries*, seminar at the Astrophysics, Gravitation, and Cosmology Seminar, University of Illinois, Urbana, USA (30/11/2022).
- [12] *Testing general relativity in the nonlinear regime with black-hole binaries*, [invited](#) seminar at the Princeton Gravity Initiative, Princeton University, Princeton, USA, (14/11/2022).
- [13] *Testing general relativity in the nonlinear regime with black-hole binaries*, [invited](#) seminar at Universidad Nacional Autónoma de México, Ciudad de México, México, (27/10/2022).
- [14] *Testing general relativity in the merger-ringdown phase of binary black hole coalescences*, [invited](#) talk at the workshop “Fundamental aspects of gravity”, Imperial College London, United Kingdom, (11/08/2022).
- [15] *Binary black hole coalescence in scalar-Gauss-Bonnet gravity*, talk at the workshop “Frontiers in Numerical Relativity”, Friedrich-Schiller Universität Jena, Germany, (29/07/2022).
- [16] *Binary black hole coalescence in scalar-Gauss-Bonnet gravity*, [invited](#) talk at International Centre for Theoretical Physics Asia-Pacific, China (02/06/2022).
- [17] *Probing strong-field gravity with multimessenger neutron star observations*, [invited](#) talk at Le Laboratoire Univers et Théories (LUTH), l’Observatoire de Paris and Université Paris Cité, France (07/04/2022).
- [18] *Probing gravitational parity violation with compact binaries*, at the “DPG-Frühjahrstagung”, (21/03/2022).
- [19] *Tests of general relativity with isolated neutron stars*, [invited](#) talk for the online workshop “Recent progress on gravity tests”, (16/02/2022).
- [20] *Multi-messenger tests of strong-field gravity with neutron stars*, [invited](#) seminar at Universiteit Utrecht in Utrecht, Netherlands, (21/10/2021).

- [21] *Black hole dynamics in compact binaries beyond-general relativity*, [invited](#) seminar at Universität Tübingen in Tübingen, Germany, (30/06/2021).
- [22] *Black hole (de)scalarization in compact binaries*, [invited](#) seminar at Universidade de Aveiro in Aveiro, Portugal, (09/06/2021).
- [23] *Escalarização espontânea de buracos negros*, [invited](#) seminar at GravBR webinar, (27/05/2021).
- [24] *Spontaneous black hole scalarization*, [invited](#) at Perimeter Institute for Theoretical Physics, in Waterloo, Canada (11/02/2020).
- [25] *Exploring the strong-field regime of gravity with neutron stars*, [invited](#) webinar for the Latin American Webinars on Physics (09/12/2020).
- [26] *Spontaneous black hole scalarization*, [invited](#) at Yukawa Institute for Theoretical Physics, Kyoto University, in Kyoto, Japan (03/12/2020).
- [27] *Probing fundamental physics with neutron stars*, [invited](#) at the Instituto Superior Técnico in Lisbon, Portugal (26/11/2020).
- [28] *Neutron stars: equation of state and gravitational theory*, [invited](#) at the Nuclear Physics Journal Club, USA (2020).
- [29] *Neutron stars as laboratories for fundamental physics*, [invited](#) departmental colloquium at Kent State University in Ohio, USA (2020).
- [30] *Scalar fields and compact objects* Astrophysics, Gravitation and Cosmology Seminar at University of Illinois at Urbana-Champaign, in Illinois, USA (2019).
- [31] *Probing extreme gravity with x-ray burst oscillations* at the GR22/Amaldi13 Conference in Valencia, Spain (2019).
- [32] *Spontaneous black hole scalarization* at the GR22/Amaldi13 Conference in Valencia, Spain (2019).
- [33] *Parametrized tests of gravity: from stellar structure to gravitational waves* at the GR22/Amaldi13 Conference in Valencia, Spain (2019).
- [34] *Probing extreme gravity with NICER*, [invited](#) talk at the APS April Meeting 2019 in Denver, USA (2019).
- [35] *The shape of rotating neutron stars and systematic errors in pulse profile observations parameter estimation* at the APS April Meeting 2019 in Denver, USA (2019).
- [36] *Scalar fields and strong-field gravity*, [invited](#) talk at the Institut d'Astrophysique de Paris, France (2019).
- [37] *Scalar fields and strong-field gravity*, talk at RelAstro at Montana State University, USA (2018).
- [38] *Scalar fields and strong-field gravity: spontaneous scalarization of compact objects*, [invited](#) talk at the Kavli Institute for Cosmological Physics, University of Chicago, USA (2019).
- [39] *Illuminating the strong-field regime of gravity*, talk at RelAstro at Montana State University, USA (2018).
- [40] *Illuminating the strong-field regime of gravity*, [invited](#) talk at the National Astronomical Observatory of Japan, Japan (2018).
- [41] *A física extrema das estrelas de nêutrons*, [invited](#) talk at Universidade Federal do Pará, Brazil (2018).
- [42] *Estrelas de nêutrons: laboratórios celestes para física fundamental*, [invited](#) talk at Universidade Federal do Pará, Brazil (2018).

- [43] *I-Love-Q to the extreme*, talk at *RelAstro* at Montana State University, USA (2018).
- [44] *Neutron star masses: from astro to fundamental physics*, talk at *RelAstro* at Montana State University, USA (2017).
- [45] *Probing the strong-field regime of gravity with neutron stars*, [invited](#) talk at Montana State University, USA (2017).
- [46] *Applications of the post-Tolman-Oppenheimer-Volkoff formalism*, at the *APS April Meeting 2017* in Washington DC, USA (2017).
- [47] *Relativistic stars in scalar-tensor theories with disformal coupling*, at the *APS April Meeting 2017* in Washington DC, USA (2017).
- [48] *Confronting scalar-tensor theories of gravity against binary-pulsar observations*, at the *II Physics Graduate Student Research Symposium* in Oxford, USA (2016).
- [49] *Neutron stars in scalar-tensor theories of gravity*, [invited](#) talk at Universidade de Lisboa in Lisbon, Portugal (2016).
- [50] *Neutron stars in scalar-tensor theories of gravity*, [invited](#) talk at Universidade de Aveiro in Aveiro, Portugal (2016).
- [51] *Neutron stars in scalar-tensor theories of gravity*, [invited](#) talk at Instituto Superior Técnico in Lisbon, Portugal (2016).
- [52] *Low-mass neutron stars: universal relations, the nuclear symmetry energy and gravitational radiation* at the APS April Meeting, in Salt Lake City, USA (2016).
- [53] *Neutron stars as strong gravity probes*, [invited](#) talk at Mississippi State University's Journal Club in Starkville, USA (2015).
- [54] *Slowly rotating black hole solutions in Horndeski gravity*, at the *III Amazonian Symposium on Physics and V NRHEP Network Meeting* in Belém, Brazil (2015).
- [55] *Testing general relativity with neutron stars: a new parametrized formalism*, at the *UM Research Day* in Oxford, USA (2015).
- [56] *No-hair theorems in Horndeski gravity*, at the *Physics Graduate Student Research Symposium* in Oxford, USA (2015).
- [57] *A post-TOV formalism for relativistic stars*, at the *IV NRHEP Network Meeting* in Rome, Italy (2015).
- [58] *Tests of strong gravity with neutron star*, at the *(Non-)universal properties of neutron stars* in Bremen, Germany (2015).
- [59] *A post-TOV formalism for relativistic stars*, at the *8th Gulf Coast Gravity Meeting* in Gainesville, USA (2015).
- [60] *Dynamical Casimir effect without moving mirrors*, at the *V Week of the Federal University of Pará Graduate Program in Physics* in Belém, Brazil (2010).
- [61] *Zeta Functions and the Casimir effect*, at the *IV Week of the Federal University of Pará Graduate Program in Physics* in Belém, Brazil (2009).
- [62] *Schwinger's method for calculating non-relativistic propagators in quantum mechanics*, at the *Journal Club* in Belém, Brazil (2009).
- [63] *Quantum vacuum effects*, at the *Physics Freshman Week of Federal University of Pará* in Belém, Brazil (2008).
- [64] *Quantum field theory in spaces with boundaries with emphasis on the dynamical Casimir effect*, at the *XIV Seminar of Undergraduate Research of Federal University of Pará* in Belém, Brazil (2008).

[65] *Quantum field theory in spaces of boundaries*, at the XVIII Seminar of Undergraduate Research of Federal University of Pará in Belém, Brazil (2007).

[66] *Quantum field theory in the presence of boundaries*, at the XVII Seminar of Undergraduate Research of Federal University of Pará in Belém, Brazil (2006).

CONFERENCE POSTERS

[1] K. Glampedakis, G. Pappas, H. O. Silva and E. Berti, *A post-TOV formalism for relativistic stars*, at the *Compact Objects as Astrophysical and Gravitational Probes* in Leiden, Netherlands (2015).

[2] H. O. Silva, H. Sotani, E. Berti and M. Horbatsch, *Torsional oscillations of neutron stars in scalar-tensor theory*, at the *GR@99* in Bad Honnef, Germany (2014).

[3] A. L. C. Rego, C. Farina, H. O. Silva and D. T. Alves, *Dynamical Casimir effect with time dependent Robin boundary conditions in 3+1 dimensions*, at the *Physics Meeting* in Foz do Iguaçu, Brazil (2010).

[4] J. S. S. Júnior and H. O. Silva, *Casimir effect with soft boundary conditions at finite temperature*, at the *II Amazonian School on Quantum Theory and Applications* in Belém, Brazil (2010).

[5] J. S. S. Júnior and H. O. Silva, *Mass and temperature corrections to the Casimir effect*, at the *XXVII Meeting of Physicists from North and Northeast* in Belém, Brazil (2009).

[6] D. T. Alves, E. R. Granhen, H. O. Silva and M. G. Lima, *Quantum radiation force on the mirrors of a non-static cavity, with Dirichlet and Neumann boundary conditions for a vacuum, finite Temperature and coherent state*, at the *Workshop on Quantum Nonstationary Systems* in Brasília, Brazil (2009).

[7] J. S. S. Júnior, H. O. Silva and D. T. Alves, *Casimir effect and lattice regularization*, at the *V Undergraduate Research Journey of the Program of Tutorial Education of Pará* in Belém, Brazil (2009).

[8] H. O. Silva, C. F. B. Macedo and L. C. B. Crispino, *Solution of the one-dimensional Schrödinger equation for a particle in an infinite potential well in a discrete spacetime*, at the *V Undergraduate Research Journey of the Program of Tutorial Education of Pará* in Belém, Brazil (2009).

VISITS

Long (more than a week) scientific visits:

[1] **National Astronomical Observatory of Japan** September – October 2018
Visited the Division of Theoretical Astronomy of the National Astronomical Observatory of Japan and collaborated with Hajime Sotani. Visit resulted in the publication [22].
Host: Hajime Sotani.

[2] **Universidade Federal do Pará** June 2018
Visited the Departamento de Física and the Faculdade de Ciências of the Universidade Federal do Pará, Belém and Salinópolis campuses.
Hosts: Luis C. B. Crispino and Caio F. B. Macedo

[3] **University of Nottingham** May – July 2017
Visited the University of Nottingham and collaborated with Prof. Thomas P. Sotiriou. Collaboration resulted in the publication [17].
Host: Thomas P. Sotiriou.

[4] **Instituto Superior Técnico** April – July 2016
Visited the Gravitation at Técnico (GRIT) group, led by Prof. Vitor Cardoso. Collaboration resulted in the publications [12] and [13].
Host: Vitor Cardoso.

[5] **Instituto Superior Técnico** May – July 2015
Visited the Gravitation at Técnico (GRIT) group, led by Prof. Vitor Cardoso. Collaboration resulted in the publication [9].
Host: Vitor Cardoso.

[6] **Federal University of Rio de Janeiro**

January – July 2010

I was an exchange student visiting the **Physics Institute**. I attended a graduate level special topics course on quantum vacuum effects. Collaboration with the group of Prof. Carlos Farina resulted in the publication [3].

Host: Carlos Farina.

MENTORING

Current:

[1] **Sagnik Saha**

Graduate student in physics, University of Illinois Urbana-Champaign, USA.

Period: 2024–ongoing.

Previous:

[2] **Reagan Cox**

Undergraduate student in physics, Montana State University, USA.

Project: *Neutron stars in massive scalar-tensor gravity*.

Primary advisor: Nicolás Yunes.

Period: 2017–2019.

[3] **Tanísia de Fátima de Moraes Cardoso**

Undergraduate student in physics, Federal University of Pará, Brazil.

Project: *Path integrals in quantum mechanics*.

Primary advisor: Silvana Perez.

Period: 2009–2010.

[4] **Jocivaldo Siqueira da Silva Júnior**

Undergraduate student in physics, Federal University of Pará, Brazil.

Project: *Casimir Effect: static and dynamical*.

Primary advisor: Danilo T. Alves.

Period: 2009–2011.

[5] **Monique Valério Silva**

High-school student, Federal University of Pará, Brazil

Project: *Studies on mechanics in high-school with the aid of computational techniques*.

Primary advisor: Luis Carlos Bassalo Crispino.

Period: 2009.

TEACHING
EXPERIENCE

Albert Einstein Institute, Potsdam, Germany

- In 2022 and 2024, I was an invited lecturer for Prof. Alessandra Buonanno’s course “Gravitational Waves” in the International Max Planck Research School on Gravitational-Wave Astronomy. I lectured on black-hole perturbation theory and quasinormal modes. (Total of 3 hours.) The audience consisted of graduate students at the AEI, Humboldt University, and the University of Maryland – College Park. The course material is available on my website at www.phy.olemiss.edu/hosilva/teaching.

Instructor: Alessandra Buonanno

December 2022 and December 2024

University of Mississippi, Oxford, MS, USA

Grader

August – December 2015

- Graded assignments for graduate level course in general relativity (PHYS 729).
- Main instructor: Luca Bombelli.

Grader

August – December 2015

- Graded assignments for introductory astronomy class (ASTR 103).
- Main instructor: James Hill.

- PHYS 221 and 222: Laboratory Physics for Science and Engineering.
 - Undergraduate course in introductory laboratory physics for science and engineering majors.
 - I worked as a teaching assistant of two sections (~ 50 students) per semester during this period. I was responsible for engaging the student in the laboratory activities and grading their assignments (weekly experiment reports and tests). I also served as a tutor (2 hrs/week) helping undergraduate students with their classwork.
 - Laboratory Physicist: [Thomas Jamerson](#).

PROFESSIONAL
SERVICE

Referee

I have served as a referee for the following funding agency: Swiss National Science Foundation.

I have also served as a referee for the following scientific journals [where (*n*) indicates the number of refereed manuscripts]:

- *Physical Review D* (14),
- *International Journal of Modern Physics D* (3),
- *General Relativity and Gravitation* (4),
- *Classical and Quantum Gravity* (3),
- *The Astrophysical Journal* (3),
- *Monthly Notices of the Royal Astronomical Society* (2),
- *Physical Review Letters* (2),
- *Universe* (2),
- *Journal of High Energy Physics* (2),
- *Journal of Cosmology and Astroparticle Physics* (2),
- *Acta Polytechnica* (1),
- *European Journal of Physics C* (1),
- *International Journal of Modern Physics E* (1),
- *Modern Physics Letters A* (1),
- *Physics of the Dark Universe* (1),
- *Physical Review E* (1),
- *Physics* (1),
- *Particles* (1),

Judging committees

I participated in the following undergraduate thesis defense:

- [1] Tanísia de Fátima de Moraes Cardoso, 2010
Undergraduate student in Physics, Federal University of Pará,
Title: *Path integrals in quantum mechanics*.

INSTITUTIONAL
RESPONSIBILITIES

- Member of the Executive Committee of the Illinois Center for Advanced Studies of the Universe since September 2024.
- Co-organizer of the Astrophysical and Cosmological Relativity Department’s weekly seminar between 08/2021 and 08/2023.
- Co-organizer of the “Tests of General Relativity” meetings at the Albert Einstein Institute between 03/2021 and 09/2022.

MEMBERSHIP IN
SCIENTIFIC
SOCIETIES

I am a member of the following organizations:

- [American Physical Society](#).
- [Sociedade Brasileira de Física](#).
- [União dos Físicos dos Países de Língua Portuguesa](#).

OUTREACH AND
SERVICE

[arXiv.BR](#)

2014 - 2024

- I maintained and ran the X (formerly Twitter) account arxiv_br. The account shared papers by Brazilian scientists (and foreigners at Brazilian institutions) which have been posted to the arXiv the gr-qc, astro-ph and hep-th sections. I also posted threads on the history of science in Brazil and the latest events in the field of gravitational physics in Portuguese. The account regularly interacted with the accounts of major Brazilian institutions such as the [Centro Brasileiro de Pesquisas Físicas](#) and the [Academia Brasileira de Ciências](#).

Federal University of Pará

2009 – 2011

Student representative

- During the academic years of 2009–2010 and 2010–2011, I was one of the two student representatives at the graduate program in physics at the Federal University of Pará. My role was to act as an active voice representing the students and participating in decisions concerning the graduate program.

2015 MS Region VII Science Fair

March 2015

- Judge of the science fair projects in the “Lower Fair” session.

University of Mississippi,

April 2015 – January 2016

Physics Graduate Student Association (PGSA)

- I am a founding member of the PGSA at University of Mississippi. PGSA’s goal is to stimulate the interaction among the physics student, through events and social activities. During the period from April 2015 to January 2016 I served as vice-president.

ORGANIZATION

EFTs, Gravity, and Fluid Dynamics:

Progress, Challenges, and Emerging Opportunities Workshop,

December 2024

- Co-organized with Patrick Draper, Jorge Noronha, and Helvi Witek. This three-day workshop gathered experts on effective field theory, gravity, and fluid dynamics to discuss and explore synergies at the intersection of these three subjects.

Connecting the dots: Toward inspiral-merger-ringdown gravitational waveforms beyond general relativity,

June 2023

- Co-organized with Félix-Louis Julié, Elisa Maggio, Laura Sberna and Sebastian Völkel. This three-day workshop gathered experts on various aspects of gravitational-waveform modeling to discuss the status and challenges in developing inspiral-merger-ringdown waveforms in extensions to general relativity.

1st School of the Graduate Program in Physics of the Federal University of Pará,

January 2011

- Co-organized with Profs. Petrus A. A. Júnior, Danilo T. Alves and Luís C. B. Crispino. This week-long school offered mini-courses, at the advanced undergraduate level, on Electromagnetism, Statistical Mechanics and Quantum Mechanics (and seminars on research topics by the faculty of Federal University of Pará) for university level students in the Belém area, attracting participants from four universities.

Physics Graduate Student Research Symposium,

September 2015

- Co-organized with other PGSA members. The event consisted of an afternoon with short communications by the student body of the Department of Physics and Astronomy, at University of Mississippi.

1st Annual UM-MSU Joint Physics Research Symposium,

February 2016

- Co-organized with other PGSA members. The symposium consisted of a day with short communications (and poster presentations) by undergraduate and graduate students from the Departments of Physics and Astronomy from both University of Mississippi and Mississippi State University.

COMPUTATIONAL SKILLS

Computer programming and others:

- Python, C++, Gnuplot, L^AT_EX, HTML, and CSS.

Mathematical software:

- Mathematica and Maple.

Operating systems:

- Microsoft Windows, Mac OSX and Linux.

LANGUAGES

Portuguese (Native) and English (Fluent).

MORE
INFORMATION

More information can be found in my website
www.phy.olemiss.edu/~hosilva.