

# Curriculum Vitae - Lucas Cesar Gomes Alvarinho Squillante

## 1. University education

| Period                            | Title  | Institution  |
|-----------------------------------|--|--|
| August/2023<br>-<br>August/2025   | Post-doc (ongoing)<br>Supervisor: Prof. Dr. Mariano de Souza | São Paulo State University<br>- Unesp - Rio Claro, SP - Brazil |
| February/2019<br>-<br>July/2023   | Ph.D. in Physics<br>Advisor: Prof. Dr. Mariano de Souza      | São Paulo State University<br>- Unesp - Rio Claro, SP - Brazil |
| August/2015<br>-<br>December/2017 | M.Sc. in Physics<br>Advisor: Prof. Dr. Mariano de Souza      | São Paulo State University<br>- Unesp - Rio Claro, SP - Brazil |
| February/2010<br>-<br>August/2015 | B.Sc. in Physics   | São Paulo State University<br>- Unesp - Rio Claro, SP - Brazil |

## 2. Awards

During my Masters and Ph.D., I had the opportunity to attend several scientific events in which we received the following awards:

- Best poster award of poster entitled “Elastocaloric-effect-induces adiabatic magnetization in paramagnetic salts due to the mutual interactions” presented at the First Iberoamerican Meeting on Quantum Materials and Electronic Structures: Theory and Experiments (2023);
- Honorable mention of poster presented in the Autumn Meeting of the Brazilian Physical Society with poster entitled “Adiabatic magnetization in paramagnetic salts without applied magnetic field” (2023);
- Best poster prize from the Institute of Physics (IOP) for being selected as the best poster of the entire conference at the Autumn Meeting of the Brazilian Physical Society (2023);
- Honorable mention of poster presented in the Autumn Meeting of the Brazilian Physical Society with poster entitled “Giant caloric effects close to *any* critical end point” (2022);
- Best poster award in the conference Strongly Correlated Electron Systems (SCES) with poster entitled “Zero-field quantum criticality and the role played by the mutual interactions in paramagnets” (2021);
- Carl Storm Underrepresented Minority Fellowship to participate in the conference “Conductivity and Magnetism in Molecular Materials” in Smithfield, RI - USA, Gordon Research Conferences (2018);
- Best poster award in the XL National meeting of solid state physics with poster entitled “Investigation of the charge-ordered phase in molecular conductors”, Brazilian Physical Society (2017);
- Best talk entitled “Investigation of the Mott-Hubbard phase in molecular conductors” at the Fluminense Federal University Physics School (2017);
- Exchange award - 3 weeks at the National High-Magnetic Field Laboratory - Tallahassee, FL - USA - Grants provided by the QuantEmX program, ICAM, and the Gordon & Betty Moore foundation (2017);

- Best poster award at the XIV Brazilian Electronic Structure School with poster entitled “A comparative study among the various phases of the binary alloy  $\text{FeSe}_{1-x}$ ”, Brazilian Physical Society (2014);
- Best poster award at the XXXVII National meeting of solid state physics with poster entitled “Investigation of the physical properties of the binary alloy  $\text{FeSe}_{1-x}$ ”, Brazilian Physical Society (2014).

Regularly engaged in the peer-review ecosystem and motivated to shape the scientific record through rigorous editorial contributions, I am now an active reviewer of the following journals:

- Nature Materials;
- Physical Review B;
- Physical Review Letters;
- Physical Review Materials;
- Journal of Physics: Condensed Matter (IOP trusted reviewer);
- Brazilian Journal of Physics.

### 3. Publications

- 1. Regularization of the critical phenomena theory by employing the non-additive  $q$ -entropy and the Grüneisen parameter**  
S.M. Soares, L. Squillante, H.S. Lima, C. Tsallis, M. de Souza, Universally nondiverging Grüneisen parameter at critical points, *Physical Review B* **111**, L060409 (2025).  
<https://doi.org/10.1103/PhysRevB.111.L060409>
  - 2. The interdisciplinary role played by negative pressure**  
F.F. Barbosa, L. Squillante, L.S. Ricco, R.E. Lagos-Monaco, A.C. Seridonio, M. de Souza, Unveiling the interdisciplinary character of negative pressure, *American Journal of Physics* **93**, 314 (2025).  
<https://doi.org/10.1119/5.0186499>
  - 3. Connection between statistical mechanics, critical phenomena, the origin of life, and diseases treatment**  
L. Squillante, I.F. Mello, L. S. Ricco, M. F. Minicucci, A. Magnus Ukpong, A. C. Seridonio, R. E. Lagos-Monaco, M. de Souza, Cellular Griffiths-like phase, *Heliyon* **10**, e34622 (2024).  
<https://doi.org/10.1016/j.heliyon.2024.e34622>
  - 4. Universe expansion under the light of condensed matter physics**  
L. Squillante, G. O. Gomes, I. F. Mello, G. Nogueira, A. C. Seridonio, R. E. Lagos-Monaco, M. de Souza, Exploring the expansion of the universe using the Grüneisen parameter, *Results in Physics* **57**, 107344 (2024).  
<https://doi.org/10.1016/j.rinp.2024.107344>
  - 5. Proposal of a breakdown of a Quantum Mechanics theorem and optimization of quantum computing**  
L. Squillante, L. S. Ricco, A. M. Ukpong, R. E. Lagos-Monaco, A. C. Seridonio, M. de Souza, Grüneisen parameter as an entanglement compass and the breakdown of the Hellmann-Feynman theorem, *Physical Review B* **108**, L140403 (2023).  
<https://doi.org/10.1103/PhysRevB.108.L140403>
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**6. Using the Ising model to treat epidemics spread with focus on Covid-19**

I.F. Mello, L. Squillante, G.O. Gomes, A.C. Seridonio, M. de Souza, Epidemics, the Ising-model and percolation theory: A comprehensive review focused on Covid-19, *Physica A: Statistical Mechanics and its Applications* **573**, 125963 (2021).

<https://doi.org/10.1016/j.physa.2021.125963>

**7. Proposal of experimentally attaining adiabatic magnetization by manipulating the mutual interaction in a paramagnetic system**

L. Squillante, I.F. Mello, A.C. Seridonio, M. de Souza, Elastocaloric-effect-induced adiabatic magnetization in paramagnetic salts due to the mutual interactions, *Scientific Reports* **11**, 9431 (2021).

<https://doi.org/10.1038/s41598-021-88778-4>

**8. Proposal on the maximization of caloric effects close to *any* critical end point**

L. Squillante, I.F. Mello, A.C. Seridonio, M. de Souza, Giant caloric effects close to any critical end point, *Materials Research Bulletin* **142**, 111413 (2021).

<https://doi.org/10.1016/j.materresbull.2021.111413>

**9. Detailed investigation on the role played by mutual interactions in real paramagnetic systems: proposal about the impossibility of achieving a genuine zero-field quantum phase transition**

L. Squillante, I.F. Mello, Gabriel O. Gomes, A.C. Seridonio, R.E. Lagos-Monaco, Harry Eugene Stanley, Mariano de Souza, Unveiling the physics of the mutual interactions in paramagnets, *Scientific Reports* **10**, 7891 (2020).

<https://doi.org/10.1038/s41598-020-64632-x>

**10. Proposal of an electronic Griffiths-like phase in a spin liquid candidate system**

I.F. Mello, L. Squillante, G.O. Gomes, A.C. Seridonio, M. de Souza, Griffiths-like phase close to the Mott transition, *Journal of Applied Physics* **128**, 225102 (2020).

<https://doi.org/10.1063/5.0018604>

**11. Exploration of the quantum character in model systems under the light of the magnetic Grüneisen parameter**

G.O. Gomes, L. Squillante, A.C. Seridonio, A. Ney, R.E. Lagos, Mariano de Souza, Magnetic Grüneisen parameter for model systems, *Physical Review B* **100**, 054446 (2019).

<https://doi.org/10.1103/PhysRevB.100.054446>

**12. Disentangling ionic and electronic contributions to the electric polarization in the Fabre salts**

M. de Souza, L. Squillante, C. Sônego, P. Menegasso, P. Foury-Leilekian, J.-P. Pouget, Probing the ionic dielectric constant contribution in the ferroelectric phase of the Fabre salts, *Physical Review B* **97**, 045122 (2018).

<https://doi.org/10.1103/PhysRevB.97.045122>

**5. Participation in scientific events**

- Wolfram Summer School - Bentley University - Waltham, MA, USA (**Selected candidate** - scheduled to take place from June 22-July 11, 2025)
  - APS-SAIFR Satellite Global Physics Summit - São Paulo, SP (2025).  
**Talk:** Grüneisen parameter as an entanglement compass and the breakdown of the Hellmann-Feynman theorem  
Link for video presentation: <https://youtu.be/olu7BFv9EmQ?t=1306>
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- European Magnetic Field Laboratory (EMFL) Spring School - Dresden, Germany (2024).  
**Poster presented:** Elastocaloric-effect-induced adiabatic magnetization in paramagnetic salts due to the mutual interactions
- Fapesp Interdisciplinary School, Exact and Natural Sciences, Engineering, and Medicine - São Paulo, SP (2023).  
**Poster presented:** Unveiling the interdisciplinary character of Ising-like models
- First Iberoamerican Meeting on Quantum Materials and Electronic Structures: Theory and Experiments - UFES, Vitória, ES (2023).  
**Poster presented:** Elastocaloric-effect-induced adiabatic magnetization in paramagnetic salts due to the mutual interactions
- II Condensed Matter Theory in the Metropolis - ICTP-SAIFR/IFT-UNESP, São Paulo, SP (2022).  
**Poster presented:** Zero-field quantum criticality and the role played by the mutual interactions in paramagnets.  
**Poster presented:** Giant caloric effects close to *any* critical end point.
- School on disordered elastic systems - ICTP-SAIFR/IFT-UNESP, São Paulo, SP (2022);
- Autumn meeting of the Brazilian physical society - University of São Paulo (USP), São Paulo, SP (2022).  
**Poster presented:** Giant caloric effects close to *any* critical end point.  
**Talk:** Elastocaloric-effect-induced adiabatic magnetization in paramagnetic salts due to the mutual interactions.
- Autumn meeting of the Brazilian physical society - Online (2021).  
**Talk:** Unveiling the physics of the mutual interactions in paramagnets.
- International conference on strongly correlated electron systems (SCES) - Online (2021).  
**Poster presented:** Zero-field quantum criticality and the role played by the mutual interactions in paramagnets.
- Autumn meeting of the Brazilian physical society - Online (2020).  
**Talk:** Magnetic Grüüneisen parameter for model systems.
- Autumn meeting of the Brazilian physical society - Aracaju, SE (2019).  
**Talk:** Exploring the ionic dielectric constant contribution in the Mott-Hubbard phase of molecular metals.
- Second Brazilian synchrotron school: fundamentals and applications (2018).

## 7. Patents submitted to INPI

1. L. Squillante, M. de Souza, *Método de separação de Hélio-3 ( $^3\text{He}$ ) e Hélio-4 ( $^4\text{He}$ ) de reservas naturais*. Registry number: BR1020230278035;
2. L. Squillante, M. de Souza, *Sistema e método de extração de minério de ferro dos rejeitos de mineração utilizando um sistema modificado e otimizado do tipo WHIMS (separador magnético úmido de alta intensidade)*. Registry number: BR10202302496.

## 8. Quantitative indicators

1. Publications in international journals: 12  
**Google Scholar:** [https://scholar.google.com.br/citations?hl=pt-BR&user=7ArEk5kAAAAJ&view\\_op=list\\_works&sortby=pubdate](https://scholar.google.com.br/citations?hl=pt-BR&user=7ArEk5kAAAAJ&view_op=list_works&sortby=pubdate)  
h-index: **7**; i10-index: **6** (source: Google Scholar)
2. Citations in the literature according to Google scholar: 172 (accessed in March 20<sup>th</sup>, 2025)

**9. ORCID**

<https://orcid.org/0000-0003-3433-1353>

**10. Additional information**

Proficient in English (TOEFL iTP: 610/ TOEFL iBT: 96), knowledge in using softwares such as Python, Wolfram Mathematica, and Origin, among others. Co-author of several scientific divulgation articles in newspapers and magazines such as “Unesp Ciência” and “Ciência Hoje”. Experience in low-temperature physics ( $1.4 < T < 300$  K) under external magnetic fields  $B < 12$  T, with emphasis on electrical transport measurements and thermal expansion, basic notions of solid state and electrochemical synthesis, basic knowledge of Raman spectroscopy, and advanced knowledge in operating closed-cycle cryostats. Co-host of the YouTube channel “Conhecimentos de Física - CdF” - [www.youtube.com/@conhecimentosdefisica](http://www.youtube.com/@conhecimentosdefisica).

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