

# CURRICULUM VITAE

**LUCAS NICOLAO**

Assistant Professor in Computational Physics at the Physics Department  
of the Federal University of Santa Catarina (UFSC).

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Native Portuguese speaker, fluent in English, Italian and Spanish.

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## EDUCATION AND ACADEMIC CAREER

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Universidade Federal de Santa Catarina (Florianópolis, Brasil)

**Assistant professor** (2014 - )

Teaching of Computational Physics and Theoretical Physics

Universidade Federal do Rio Grande do Sul (Porto Alegre, Brasil)

**Postdoctoral Research Associate** (2012 - 2014)

“Correlating structural and electronic properties of nanoparticles with catalyst reactivity”

Supervisor: Jonder Morais

Fellowship: PNPd - Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - CAPES.

Università La Sapienza (Roma, Italy)

**Postdoctoral Research Associate** (2011 - 2012)

“Large scale behaviour in high dimensional spin glasses”

Supervisors: Giorgio Parisi and Federico Ricci-Tersenghi

Fellowship: European Research Council under European Union's 7th Framework Programme.

**Postdoctoral Research Associate** (2010 - 2011)

“Off-equilibrium numerical simulations of complex systems with glass transition”

Supervisors: Giorgio Parisi and Federico Ricci-Tersenghi

Fellowship: Conselho Nacional de Desenvolvimento Científico e Tecnológico - CNPq.

Universidade Federal do Rio Grande do Sul (Porto Alegre, Brasil)

**PhD in Physics** (2005 - 2009)

Thesis: “Modulated phases in ultrathin magnetic films with perpendicular anisotropy”

Advisor: Daniel Adrian Stariolo

Fellowship: Conselho Nacional de Desenvolvimento Científico e Tecnológico - CNPq.

## **Master in Physics (2003-2005)**

Title: "Modulated phases in dipolar ferromagnetic films"

Advisor: Daniel Adrian Stariolo

Fellowship: Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - CAPES.

## **Bachelor's degree in Physics (1999-2003)**

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## **TEACHING EXPERIENCE**

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All courses correspond to 72 hours semester long courses, unless noted.

### **Universidade Federal do Rio Grande do Sul (UFRGS):**

- Physics IV - 2013/1, 2013/2, 2014/1

### **Universidade Federal de Santa Catarina (UFSC):**

- Physics I - 2014/2, 2015/1, 2016/1, 2017/2, 2018/1, 2019/1, 2020/1, 2020/2
- Introduction to Computational Physics - 2014/2, 2015/1, 2015/2, 2016/1, 2018/1, 2018/2, 2019/1, 2023/2, 2024/2
- Computational Physics - 2015/2, 2016/1, 2016/2, 2016/2, 2017/1, 2017/2, 2018/2, 2019/2, 2022/2, 2024/1
- Computational Statistical Mechanics - 2020/1, 2021/1, 2024/1
- Physics II - 2021/2, 2022/2, 2024/2
- Thermodynamics - 2023/1, 2023/2

### **Physics Graduate Program (UFSC):**

- Phase transitions and critical phenomena - 2017/1, 2023/1
- Introduction to Computational Statistical Mechanics - 2021/1
- *Invited Lecture*: Introduction to CUDA - set of 3 lectures - 2014/1
- *Invited Lecture*: Monte Carlo Method - set of 3 lectures - 2015/1

### **Honors**

- Honored guest professor in the Physics graduation ceremony of august 2024
- Honored guest professor in the Physics graduation ceremony of march 2021
- Honored guest professor in the Physics graduation ceremony of september 2019

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## **ADVISING AND EXAMINATIONS**

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Member of final examination commission of 3 Undergraduate Thesis, 17 Master Dissertations (2 as an external examiner), 12 PhD qualification exams and 14 PhD Thesis (1 as an external examiner).

### **Concluded supervisions:**

#### *Undergrad*

- Leonardo Garibaldi Rigon. *Monte Carlo simulations and the J1-J2 Ising model with competitive interactions*. 2015-2017.
- Rômulo Cenci. *Overdamped Langevin Simulations of soft-core particles in 1d*. 2016-2018.
- Leonardo Souto Ferreira. *Onset of turbulence in the one-dimensional damped Kuramoto-Sivashinsky equation and its large scale spatial structure*. 2017-2019.
- Heloise Pereira. *The inverse problem in statistical physics as a tool for the study of social dynamics*. 2019-2020.
- Lucas André de Mello. *Noise-induced nonequilibrium phase transition*. 2020-2020.
- Franco Sauvisky. *An OpenCL implementation for Monte Carlo simulations of short-range Ising models*. 2021-2022
- Maria Eduarda Evangelista da Silva. *First passage times in overdamped Langevin equations with multiplicative noise*. 2022-2023
- Luiza Duarte Borges. *Simulations of active matter*. 2023-2024

#### *Master*

- Caio Eduardo Aguiar de Araujo. *Discrete models for sulfetation and reduction of metallic nanoparticles*. 2017.
- Josué Lima Lopes. *Field theories simulations for magnetic systems*. 2017.
- Eduardo Lucas Lorenzon (co-advisor). *Monte Carlo Simulations for an Iron-Platinum alloy phase transition*. 2018.
- Fabio Moreira de Oliveira. *Physics Applied to Traffic*. (National Professional Master in Physics Teaching). 2019.
- Leonardo Garibaldi Rigon. *Nematic phase in the J1-J2 model*. 2017-2020.
- Rômulo Cenci. *Cluster forming crystals in systems of repulsive particles*. 2019-2021.
- Igor Guilherme Cambrussi Goelzer. *Nematic phase in the Ising-dipolar model in two dimensions*. 2022-2014.

#### *PhD*

- Marcelo Salvador. *Micromagnetic simulations of magnetic nanoparticles*. 2015-2020.

#### *Post-Doc*

- Massimo Ostilli. *Inverse problem in social networks*. 2017-2018.

### **Currently supervising:**

#### *Undergrad*

- Matheus Eduardo de Batim. *Simulations of active matter*. 2024-

#### *Master*

- Lucas André de Mello. *Noise-induced nonequilibrium phase transition*. 2021-
- Lucas Massoni Pires, *Skyrmion hexatic phase in helimagnetic films*. 2024-

PhD

- Eduardo Lucas Lorenzon. *Ising-dipolar model in the triangular lattice*. 2018-
- Caio Eduardo Aguiar De Araújo. *Sulfetation and growth of metallic nanoparticles*. 2017-
- Josué Lima Lopes. *Simulations of field theories for ferromagnetism*. 2017-
- Pedro Ricardo Piccini (co-advisor). *Modulated phases in systems with competing interactions*. 2015-
- Rômulo Cenci. *Cluster crystals and mesophases in two-dimensional system of particles*. 2021-

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## PUBLICATIONS

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1. MENDOZA-COTO, ALEJANDRO ; MATTIELLO, VALÉRIA ; CENCI, RÔMULO ; DEFENU, NICOLÓ ; NICOLAO, LUCAS . Melting of the two-dimensional solid phase in the Gaussian core model. PHYSICAL REVIEW B, v. 109, p. 064101, 2024.
2. SALVADOR, MARCELO ; NICOLAO, LUCAS ; FIGUEIREDO, WAGNER . Non-monotonic Behavior of the Blocking Temperature of Interacting Magnetic Nanoparticles. BRAZILIAN JOURNAL OF PHYSICS, v. 53, p. 70, 2023.
3. PICCINI, PEDRO R. ; NICOLAO, LUCAS ; TRAGTENBERG, M.H. R. . The Blume-Emery-Griffiths Model with Competing Interactions on the Bethe Lattice. BRAZILIAN JOURNAL OF PHYSICS, v. 53, p. 95, 2023.
4. SALVADOR, MARCELO ; NICOLAO, LUCAS ; FIGUEIREDO, WAGNER . Magnetic relaxation of a system of interacting magnetic nanoparticles at finite temperature. PHYSICA B-CONDENSED MATTER, v. 649, p. 414497, 2023.
5. BOITA, JOCENIR; DE ARAÚJO, CAIO E. A.; NICOLAO, LUCAS; ALVES, MARIA DO CARMO MARTINS; MORAIS, JONDER. Kinetics and Reversibility of Sulfur Reaction with Pt<sub>0.3</sub>Cu<sub>0.7</sub> Nanoparticles. Journal of Physical Chemistry C, v. 001, p. 001, 2021.
6. SALVADOR, MARCELO; NICOLAO, LUCAS; FIGUEIREDO, WAGNER. Thermal relaxation in a disordered one-dimensional array of interacting magnetic nanoparticles. JOURNAL OF MAGNETISM AND MAGNETIC MATERIALS v. 538, p. 168254, 2021.
7. MENDOZA-COTO, ALEJANDRO; DE OLIVEIRA, DANILO E. B.; NICOLAO, LUCAS; DÍAZ-MÉNDEZ, ROGELIO. Topological phase diagrams of the frustrated Ising ferromagnet. PHYSICAL REVIEW B. v.101, p.174438, 2020.
8. SALVADOR, MARCELO; NICOLAO, LUCAS; FIGUEIREDO, W. Competing cubic and uniaxial anisotropies on the energy barrier distribution of interacting magnetic nanoparticles. PHYSICAL REVIEW B. v.100, p.104419-1, 2019.

9. NICOLAO, LUCAS; OSTILLI, MASSIMO; Critical states in Political Trends. How much reliable is a poll on Twitter?: The Potts model and the inverse problem in Social Science. PHYSICA A-STATISTICAL MECHANICS AND ITS APPLICATIONS. v.533, p.121920, 2019.
10. MENDOZA-COTO, ALEJANDRO ; NICOLAO, LUCAS ; DÍAZ-MÉNDEZ, ROGELIO . On the mechanism behind the inverse melting in systems with competing interactions. Scientific Reports, v. 9, p. 2020, 2019.
11. BOLFE, MAÍRA ; NICOLAO, LUCAS ; METZ, FERNANDO L . Phase diagram and metastability of the Ising model on two coupled networks. JOURNAL OF STATISTICAL MECHANICS-THEORY AND EXPERIMENT, v. 2018, p. 083404, 2018.
12. BOITA, JOCENIR ; NICOLAO, LUCAS ; ALVES, MARIA DO CARMO ; MORAIS, JONDER . Controlled growth of metallic copper nanoparticles. NEW JOURNAL OF CHEMISTRY, v. 2017, p. 1, 2017.
13. NICOLAO, LUCAS; MENDOZA-COTO, ALEJANDRO; STARIOLO, DANIEL. Langevin simulations of stripe forming systems with long-range isotropic competing interactions. Journal of Physics. Conference Series (Print), v. 686, p. 012005, 2016.
14. MENDOZA-COTO, ALEJANDRO; STARIOLO, DANIEL A.; NICOLAO, LUCAS. Mendoza-Coto, Stariolo, and Nicolao Reply:. Physical Review Letters, v. 117, p. 239602, 2016.
15. MENDOZA-COTO, ALEJANDRO ; STARIOLO, DANIEL A. ; NICOLAO, LUCAS . Nature of Long-Range Order in Stripe-Forming Systems with Long-Range Repulsive Interactions. Physical Review Letters, v. 114, p. 116101, 2015.
16. NICOLAO, LUCAS; PARISI, GIORGIO; RICCI-TERSENGHI, FEDERICO. Spatial correlation functions and dynamical exponents in very large samples of four-dimensional spin glasses. Physical Review. E, Statistical, Nonlinear, and Soft Matter Physics (Print), v. 89, p. 032127-032127-6, 2014.
17. BOITA, JOCENIR ; NICOLAO, LUCAS ; ALVES, MARIA DO CARMO ; MORAIS, JONDER . Observing Pt Nanoparticle Formation at the Atomic Level During Polyol Synthesis. PCCP. Physical Chemistry Chemical Physics (Print), v. 16, p. 17640-17647, 2014.
18. BOITA, JOCENIR ; BERNARDI, FABIANO ; CASTEGNARO, MARCUS VINICIUS ; NICOLAO, LUCAS ; ALVES, MARIA DO CARMO MARTINS ; MORAIS, JONDER . Reversible Sulfidation of Pt 0.3 Pd 0.7 Nanoparticles Investigated by in situ Time Resolved XAS. Journal of Physical Chemistry. C, v. 118, p. 140220051609005-5544, 2014.

19. DÍAZ-MÉNDEZ, R. ; MENDOZA-COTO, A. ; MULET, R. ; NICOLAO, L. ; STARIOLO, D. A. . Dynamics of systems with isotropic competing interactions in an external field: a Langevin approach. The European Physical Journal. B, Condensed Matter Physics (Print), v. 81, p. 309-319, 2011.

20. NICOLAO, L.; STARIOLO, D. A. . Langevin simulations of a model for ultrathin magnetic films. Physical Review. B, Condensed Matter and Materials Physics, v. 76, p. 054453-054453-9, 2007.

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## CONFERENCES

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### **Organization:**

*X Encontro de Física e Astronomia da UFSC.* 2024. Lucas Nicolao ; Gustavo Nicolodelli ; Luis Guilherme de Carvalho Rego ; Roberto Kalbush Saito ; Alyson Fernando de Barros ; Bruna Vallin Simão ; Giovana Conod ; João Pedro Engster ; Letícia Bertuzzi ; Rafael Pacheco Cardoso ; Victor Hugo Sasse .

*Encontro de Outono da Sociedade Brasileira de Física.* 2024. Paulo Henrique Souto Ribeiro ; Kaline Coutinho ; Paulo Barbeitas Miranda ; Renne Luiz Camara Medeiros de Araujo ; Lucas Nicolao ; Marta Elisa Rosso Dotto.

*IX Encontro de Física e Astronomia da UFSC.* 2021. Ivan Bechtold ; Lucas Nicolao ; Antonio Marcos Machado ; Eduardo Inacio Duzzioni ; Luis Guilherme de Carvalho Rego ; Carline Biesdorf ; Rafael Pacheco Cardoso ; Bruna de Oliveira Stahlhöffer ; Haimon Otto Melchior Trebien ; Bruna Vallin Simão.

*VIII Encontro de Física e Astronomia da UFSC.* 2020. Ivan Bechtold ; Lucas Nicolao ; Eduardo Inacio Duzzioni ; Antonio Marcos Machado ; Kelli de Fátima Ulbrich ; Carline Biesdorf ; Marcos Vinicios Barp ; Bruna De Oliveira Stahlhofer ; Wagner Schlindwein.

### **Presentations and participation:**

- Brazilian Workshop on Soft Matter, October 4-6, 2023, São Paulo, Brazil. Contributed Talk: *Melting of the 2D solid phase of the Gaussian-core model explained.* <https://www.ictp-saifr.org/sm2023/>
- Encontro de Outono 2023 da Sociedade Brasileira de Física. May 21-25, Ouro Preto, Brazil. Oral presentation *A general method for two-dimensional melting: the Gaussian-core model explained.* <http://www1.fisica.org.br/~eosbf/2023/index.php/en/>
- III Encontro Nacional de Física Estatística. November 22-25, 2021. Oral presentation *Inverse melting and topological phases in the frustrated Ising ferromagnet.* <http://defim.ufsj.edu.br/enfe/enfe.html>
- Encontro de Outono 2021 Sociedade Brasileira de Física. June 21-25, 2021. Oral presentation *Inverse melting and topological phases in the frustrated Ising ferromagnet.*

<http://www1.fisica.org.br/~eosbf/2021/index.php/pt/index.html>

- 16th Granada Seminar on Computational Physics. Virtual Seminars. 7-17 June 2021. <https://granadaseminar.com/index.php/past-editions-of-granada-seminar/16th-granada-seminar-on-computational-physics/>
- Random Matrix Theory and Networks Virtual Workshop, 7-18 June 2021. <https://www.pks.mpg.de/rmtnet21>
- STATPHYS27, XXVII International Conference on Statistical Physics of the International Union for Pure and Applied Physics (IUPAP). 2019. Buenos Aires, Argentina. Oral presentation *On the mechanism behind the inverse melting in systems with competing interactions*. <https://statphys27.df.uba.ar/registration/index.php/SP27/MainConference/paper/view/719>
- II Encontro Nacional de Física Estatística. September 17 to 20, 2017. Ilhéus, Brazil. Oral presentation *Inverse melting in systems with competing interactions*. <http://nbcgib.uesc.br/enfe/>
- Out of Equilibrium Dynamics in Soft and Condensed Matter. August 28 - September 01, 2017. Natal, Brazil. Oral presentation *Spatial correlation functions and dynamical exponents in very large samples of 4D spin glasses*. <https://www.iip.ufrn.br/eventslectures?inf==4ERZhnTR1TP>
- Encontro Nacional de Física Estatística. 1 to 4 November 2015, Vitória, Brazil. Poster presentation *Langevin simulations of two dimensional systems with competing interactions*. <http://enfe.fis.puc-rio.br/>
- VIIIth Brazilian Meeting on Simulational Physics. 3 to 8 August, 2015, Florianópolis, Brazil. Poster presentation *Langevin simulations of stripe forming systems with long-range isotropic competing interactions*.
- Mechanics: classical, statistical and quantum - A conference in honor of the 70th birthday of Giovanni Gallavotti. July 2-5, 2012. Rome, Italy.
- International Workshop on Dynamics in Viscous Liquids III, March 30 to April 2, 2011, Rome, Italy.
- Paths in complexity: fractals, superconductivity and galaxies, 24 September 2010, Rome, Italy.
- LАWNP'09 - XI Latin American Workshop on Nonlinear Phenomena, 5 to 9 October 2009, Búzios, Brazil. Poster presentation *Orientalional order of modulated phases in Langevin simulations of a scalar model with competing interactions*.
- École de Physique des Houches "Long-Range Interacting Systems", 4 to 29 August 2008, Les Houches, France. Oral presentation *Modulated Phases in Ultrathin Magnetic Films*.
- Statphys23 - XXIII International Conference on Statistical Physics of the International Union for Pure and Applied Physics (STATPHYS23), 9 to 13 July 2007, Genoa, Italy. Poster presentation *Langevin simulations of a model for ultrathin magnetic films*.
- Workshop on Dynamics and Thermodynamics of Systems with Long Range Interactions: Theory and Experiments, 4 to 8 July 2007, Assisi, Italy. Poster presentation *Langevin simulations of a model for ultrathin magnetic films*.

- Department of Physics, Havana University, May 2007, Havana, Cuba. Oral presentation (seminar) *Langevin simulations of a model for ultrathin magnetic films*.
- Second Latin American School and Conference in Statistical Physics and Interdisciplinary Applications (LASSPIA), 5 to 15 February 2007, Bento Gonçalves, RS, Brasil. Poster presentation *Modulated Phases in Langevin Simulations of a Scalar Model with Competing Interactions*.
- Pan American Scientific Institute (PASI) “From Disordered Systems to Complex Systems”, 11 to 19 December 2006, Mar del Plata, Argentina. Poster presentation *Modulated Phases in Langevin Simulations of a Scalar Model with Competing Interactions*.
- XXIX Encontro Nacional de Física da Matéria Condensada, 9 to 13 May 2006, São Lourenço, MG, Brasil. Poster presentation *Ordem intermediária em sistemas frustrados com interação dipolar*.
- XXVIII Encontro Nacional de Física da Matéria Condensada, 10 to 14 May 2005, Santos, SP, Brasil. Poster presentation *Metaestabilidade em sistemas frustrados com interação dipolar*.
- Workshop on Transport and Self-Organization in Complex Systems, 8 to 12 August 2004, Porto Alegre, RS, Brasil. Poster presentation *Phase diagram and relaxation in a continuum model for a system with dipolar interactions*.

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## OUTREACH

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All outreach activities presented in native Portuguese language.

- The 2021 Nobel Prize in Physics for Giorgio Parisi
  - o video: <http://www.sbfisica.org.br/v1/home/index.php/pt/fisica-ao-vivo/1437-fisica-ao-vivo-o-premio-nobel-de-fisica-de-2021>  
(or <https://www.youtube.com/watch?v=LP-3anifZW0>)
  - o text: <https://revistapesquisa.fapesp.br/nobel-de-fisica-vai-para-pesquisadores-que-aprimoraram-modelos-de-previsao-do-clima/>  
and <http://www.sbfisica.org.br/v1/home/index.php/pt/acontece/1426-pesquisadores-brasileiros-comentam-o-nobel-de-fisica-de-2021>
  - o 2022 Semana Acadêmica da Física
- Research group in statistical physics (2021) <https://encontro.pgfc.sites.ufsc.br/2021/grupos-de-pesquisa-do-pgfc/>  
or in <https://www.youtube.com/watch?v=DXNkEccNijI>
- Simulations in physics
  - o 2021 Semana Acadêmica da Física [https://www.youtube.com/watch?v=syg\\_ndnjLTo](https://www.youtube.com/watch?v=syg_ndnjLTo)
  - o 2019 Semana Acadêmica de Computação e Sistemas
  - o 2019 Parque Viva Ciência
- UFSC Physics Professors (2020)



<https://www.youtube.com/watch?v=NckBRHs3EBo>

- 6 hour short-course in simulations in statistical physics
  - o 2023 Semana Acadêmica da Física
  - o 2015 [III Encontro de Física e Astronomia da UFSC](#)