Rodrigo Veiga

Postdoctoral researcher

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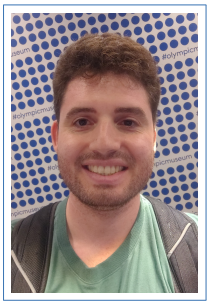

Education

2017–2022 : **PhD, Physics**, *University of São Paulo*, São Paulo, Brazil.
Thesis: *Statistical Physics Analysis of Machine Learning Models*

2010–2012 : **Master of Science, Physics**, *University of São Paulo*, São Carlos, Brazil.
Thesis: *Effects of Correlated Hybridization in the Single-impurity Anderson Model* (in portuguese)

2006–2009 : **Bachelor in Physics**, *University of São Paulo*, São Carlos, Brazil.

Publications

Articles and Conference Proceedings

2024 **R. Veiga**, A. Remizova, and N. Macris. Stochastic gradient flow dynamics of test risk and its exact solution for weak features. In *Proceedings of the 41st International Conference on Machine Learning*, volume 235 of *Proceedings of Machine Learning Research*, pages 49310–49344. PMLR, 21–27 Jul 2024.

2023 **R. Veiga**, L. Stephan, B. Loureiro, F. Krzakala, and L. Zdeborová. Phase diagram of stochastic gradient descent in high-dimensional two-layer neural networks*. *Journal of Statistical Mechanics: Theory and Experiment*, volume 2023, page 114008. IOP Publishing; *Updated version of the proceeding appearing in *Advances in Neural Information Processing Systems* 35 (NeurIPS 2022), Nov 2023.

2023 E. Cornacchia*, F. Mignacco*, **R. Veiga***, C. Gerbelot, B. Loureiro, and L. Zdeborová. Learning curves for the multi-class teacher–student perceptron. *Machine Learning: Science and Technology*, volume 4, page 015019. IOP Publishing, *Equal contribution, 2023.

2022 **R. Veiga**, L. Stephan, B. Loureiro, F. Krzakala, and L. Zdeborová. Phase diagram of stochastic gradient descent in high-dimensional two-layer neural networks. In *Advances in Neural Information Processing Systems* *NeurIPS*, volume 35, pages 23244–23255, 2022.

2020 **R. Veiga** and R. Vicente. Restricted Boltzmann machine flows and the critical temperature of Ising models, *arxiv:2006.10176* (*preprint*), 2020.

2020 **R. Veiga**, R. Murta, and R. Vicente. Age-structured estimation of COVID-19 ICU demand from low quality data, *arxiv:2006.06530* (*preprint*), 2020.

2013 V. Líbero and **R. Veiga**. Effects of correlated hybridization in the single-impurity Anderson model. In *APS March Meeting Abstracts*, volume 2013 of *APS Meeting Abstracts*, page R19.004, March 2013.

Research Experience

École Polytechnique Fédérale de Lausanne (EPFL), Switzerland

Oct 2022–present ***Postdoctoral researcher***.
SMILS - Lab for Statistical Mechanics of Inference in Large Systems
School of Computer and Communication Sciences – Information Processing Group
Supervisor: Prof. Nicolas Macris
- Financial support: EPFL, École Polytechnique Fédérale de Lausanne.

Feb 2021–Jan 2022 ***Vising doctoral student***.
IdePHICS - Information, Learning and Physics Lab
Supervisor: Prof. Florent Krzakala
- Financial support: CAPES-PrINT, Program for Institutional Internationalization; Brazil; Grant number 88887.467036/2019-00. EPFL, École Polytechnique Fédérale de Lausanne.

University of São Paulo (USP), Brazil

Jul 2017–Aug 2022 ***Doctoral student***.
IFUSP - Physics Institute
Supervisor: Prof. Renato Vicente
- Project: Statistical physics and machine learning models
- Financial support: CNPq, The National Council for Scientific and Technological Development; Brazil. Grant number 162857/2017-9.

Aug 2012–May 2013 ***Doctoral student***.
IFSC-USP São Carlos Physics Institute
Supervisor: Prof. Miled Moussa
- Project: Entanglement and quantum discord in the superradiance and applications of quantum information theory in NMR
- Financial suppport: CAPES, Coordination for the Improvement of Higher Education Personnel; Brazil. PROEX.

Mar 2010–May 2012 ***Master student***.
IFSC-USP São Carlos Physics Institute
Supervisor: Prof. Valter Líbero
- Project: Effects of correlated hybridization in the single-impurity Anderson model
- Financial support: FAPESP, The State of São Paulo Research Foundation; Brazil. Grant number 2009/13065-8.

Apr 2008–Dec 2009 ***Undergraduate student project***.
IFSC-USP São Carlos Physics Institute
Supervisor: Prof. Valter Líbero
- Project: Density functional theory applied to the antiferrimagnetic Heisenberg model
- Financial support: FAPESP, The State of São Paulo Research Foundation; Brazil. Grant number 2007/59988-4.

Teaching

Spring, 2024 : **CS526 Learning theory**, EPFL, Lausanne, Switzerland.
Master's course taught by Prof. Nicolas Macris. I was responsible for two lessons:
– 18th March: *Bias variance tradeoff and the double descent phenomenon.*
– 25th March: *Double descent, continuation and derivation for weak features model.*

Participation in events

Jul 2024 ICML, International Conference on Machine Learning; Vienna, Austria.

Poster presentation: *Stochastic Gradient Flow Dynamics of Test Risk and its Exact Solution for Weak Features*.

May 2024 Youth in High Dimensions: Recent Progress in Machine Learning, High-Dimensional Statistics and Inference; Trieste, Italy.

Contributed talk: *Time Evolution of the Test Risk under Stochastic Gradient Flow Dynamics*.

Apr 2024 From Theory to Practice: Workshop in Data Science; African Institute for Mathematical Sciences; Kigali, Rwanda.

Invited talk: *Time Evolution of the Test Risk under Stochastic Gradient Flow Dynamics*.

Aug 2023 Statistical Physics and Machine Learning Back Together; Cargèse, France.

Poster presentation: *Phase diagram of stochastic gradient descent in high-dimensional two-layer neural networks*.

Jun 2023 Mathematical Physics of Complex Systems; Cortona, Italy.

Dec 2022 NeurIPS, Conference on Neural Information Processing Systems; New Orleans, USA.

Poster presentation: *Phase diagram of stochastic gradient descent in high-dimensional two-layer neural networks*.

Apr 2022 TOPML, Workshop on the Theory of Overparameterized Machine Learning; Houston, USA; Virtual event.

Contributed talk: *Phase diagram of stochastic gradient descent in high-dimensional two-layer neural networks*.

Jun 2020 Youth in High-dimensions: Machine Learning, High-dimensional Statistics and Inference for the New Generation, *ICTP*; Trieste, Italy; Virtual event.

Dec 2019 First School on Data Science and Machine Learning, *ICTP-SAIFR*; São Paulo, Brazil.

Sep 2017 Minicourse on Machine Learning for Many-Body Physics, *ICTP-SAIFR*; São Paulo, Brazil.

Oct 2012 II SIFSC - São Carlos Physics Institute Graduate Workshop, *IFSC-USP*; São Carlos, Brazil.

Poster presentation: *Entanglement and quantum Discord in the superradiance*.

Out 2011 I SIFSC - São Carlos Physics Institute Graduate Workshop, *IFSC-USP*; São Carlos, Brazil.

Poster presentation: *Effects of correlated hybridization in the single-impurity Anderson model*.

Jul 2011 Brazilian School on Statistical Mechanics, *IIP-UFRN*; Natal, Brazil.

Poster presentation: *Effects of correlated hybridization in the single-impurity Anderson model*.

Nov 2010 XIV São Carlos Physics Institute Graduate Workshop, *IFSC-USP*; São Carlos, Brazil.

Poster presentation: *Correlated hybridization in the single-impurity Anderson model and non-local functional in the Heisenberg model*.

Computer skills </>

Programming	Python, R, Fortran, Cython, Wolfram Mathematica
Machine learning	PyTorch, Scikit-learn, Keras
Text	LaTeX
OS	Linux

Languages

English	Fluent
French	Basic
Portuguese	Native

Complementary training

May 2018 Machine Learning Engineer Nanodegree – Udacity

Udacity Online Programs. Online course.

References

Prof. Nicolas Macris
École Polytechnique Fédérale de Lausanne
✉ nicolas.macris@epfl.ch

Prof. Florent Krzakala
École Polytechnique Fédérale de Lausanne
✉ florent.krzakala@epfl.ch

Prof. Renato Vicente
University of São Paulo.
✉ rvicente@usp.br

Prof. Nestor Caticha
University of São Paulo.
✉ ncaticha@usp.br

Dr. Bruno Loureiro
École Normale Supérieure, Paris.
✉ brloureiro@gmail.com

Non-academic work experience

Jul 2013– Mar 2017 ***Financial administrator***.

Primos Materiais para Construções Ltda, Brazil.