MARIANO **CHAVES**

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Bachelor (computational physics), master's degree (neutrino oscillation theory) and finishing the Ph.D. (neutrino phenomenology) with strong **computational skills** (OOP, Python, C/C++, Java, Fortran, HPC) and **knowledge on statistics**. Has experience in statistical inference (Bayesian and Frequentist), particle physics experiment analysis, data analysis and high processing computing (HPC). Have worked in neutrino interactions for 6 years calculating neutrino oscillation formulas, and simulating solar and reactor neutrino experiments. Have used several Monte Carlo simulations for optimization and high dimensional sampling.

ABILITIES

- **Object orientated** programming (JAVA, C++ and in Python)
- Experience with GSL (C++/C).
- Data structures in C.
- **High processing and parallel computing** with OPENMP, MPI and CUDA.
- **Statistical data analysis** and inference (Frequentist and Bayesian).
- Communication and writing skills in **English at an advanced** level.
- Strong base on signal processing, FFT and filtering.
- Fortran **LAPACK** library.
- Experience with **Git** and active GitHub user.
- Experience in **Monte Carlo** optimization and sampling.
- Knowledge on the **Machine Learning** popular methods and its variants as classification, regression algorithms and neural networks.
- Advanced knowledge on **GLOBES** usage and source code.

EDUCATION

FEBRUARY, 2016

BACHELOR IN PHYSICS (COMPUTATIONAL), INSTITUTO DE CIÊNCIAS EXATAS - UNIVESIDADE FEDERAL FLUMINENSE

Undergraduate research projects:

- Games Theory: A quantum approach. Advisor: Dr. Alexandre Miranda de Grezzi Schmidt. 2013-2014 (1 year) - FAPERJ FELLOWSHIP
- Navier Stokes equation simulations: Advisor: Dr. Daniel Girard, 2014 (6 months)
- Theoretical and Computational Aspects of the Dirac Equation Wave Packets Advisor: Dr. Alexandre Miranda de Grezzi Schmidt. 2014-2015 (1 year) - FAPERJ FELLOWSHIP
- Feynman Integrals and applications: Double slits and Quantum Monte Carlo: Dr. Alexandre Miranda de Grezzi Schmidt. 2015 (1 year)

FEBRUARY, 2018

MASTERS IN PHYSICS, INSTITUTO DE FÍSICA - UNIVERSIDADE FEDERAL FLUMINENSE

Advisor: Dr. Diego Rossi Gratieri

Master Thesis: Métodos analíticos para a evolução de neutrinos na matéria sob a influência de interações não-padrão

The presentation of his master's thesis was one of the 6 awarded among 140 works presented at the XXXIX Brazilian Meeting of Physics of Particles and Fields.

ONGOING - FEBRUARY 2022

PH.D. IN PHYSICS, INSTITUTO DE FÍSICA GLEB WATAGHIN - UNIVERSIDADE ESTADUAL DE CAMPINAS

Advisor: Dr. Orlando Luis Goulart Peres

Thesis: Neutrino in quantum field theory: wave packets and new interactions

MARCH 2021

SPLIT-SITE DOCTORAL PROGRAM (GERMANY), INSTITUT FÜR TECHNOLOGIE KARLSRUHE

Advisor: Dr. Thomas Schwetz Mangold Under the PRINT/CAPES fellowship

Project: Neutrino cross-sections

TEACHING EXPERIENCE

MARCH, 2015 – FEBRUARY, 2016

MONITOR (BASIC MECHANICS), INSTITUTO DE CIÊNCIAS EXATAS - UFF

Taking question from undergraduate students about subjects related to basic physics.

MARCH, 2019 – JULY, 2019

TEACHING INTERNSHIP (ADVANCED MECHANICS, A SECOND COURSE), UNIVERSIDADE ESTADUAL DE CAMPINAS

Gave lectures and handled an undergraduate class.

JULY, 2019 – DECEMBER, 2019

TEACHING INTERNSHIP (BASIC ELECTROMAGNETISM), UNIVERSIDADE ESTADUAL DE CAMPINAS

Gave lectures and handled two undergraduate classes.

SEPTEMBER, 2020 – JANUARY, 2021

TEACHING INTERNSHIP (BASIC ELECTROMAGNETISM), UNIVERSIDADE ESTADUAL DE CAMPINAS

Gave lectures and handled two undergraduate classes.

MARCH, 2021 – JULY, 2021

TEACHING INTERNSHIP (BASIC PHYSICS II), UNIVERSIDADE ESTADUAL DE CAMPINAS

Gave lectures and handled two undergraduate classes giving lectures about undulatory behavior, hydrostatics, hidrodynamics, waves, sound and thermodynamics.

ADVANCED COURSES AND INTERNATIONAL EVENTS

DECEMBER, 2018

SBF-APS SÃO PAULO SCHOOL OF ADVANCED SCIENCE ON EXPERIMENTAL NEUTRINO PHYSICS, UNIVERSIDADE ESTADUAL DE CAMPINAS

website

JULY, 2018

SCHOOL AND WORKSHOP ON DARK MATTER AND NEUTRINO DETECTION., INSTITUTO DE FÍSICA TEÓRICA- ICTP/SAIFR

website

SEPTEMBER, 2019

NEUTRINO PHYSICS AND ASTROPHYSICS, INSTITUTO DE ESTUDOS AVANCADOS - UNICAMP

Professor: Francesco Vissani - website

OCTOBER, 2020

COSMOLOGY, THE SCIENCE OF THE UNIVERSE, INSTITUTO DE ESTUDOS AVANCADOS - UNICAMP

Professor: Rogerio Rosenfeld - website

FEBRUARY, 2021

P2IO, BSM-NU WORKSHOP, P2IO - LABEX

website

MAY, 2021

THE INTERNATIONAL WORKSHOPS ON WEAK INTERACTIONS AND NEUTRINOS 2021. RESOLVING THE LMA-DARK NSI DEGENERACY WITH COHERENT NEUTRINO-NUCLEUS SCATTERING, UNIVERSITY OF MINNETOSA - WIN2021

Talk: Resolving the LMA-dark NSI degeneracy with coherent neutrino-nucleus scattering - website

PUBLICATIONS AND PREPRINT

- Chaves, M. E., Gratieri, D. R., & Peres, O. L. (2020). Improvements on perturbative oscillation formulas including non-standard interactions. *J.Phys.G* 48 (2021) 1, 015001, Journal of Physics G: Nuclear and Particle Physics, Volume 48, Number 1, 2020.

- Chaves, M., Schwetz, T. Resolving the LMA-dark NSI degeneracy with coherent neutrino-nucleus scattering. J. High Energ. Phys. 2021, 42 (2021).
- Chaves M., Peres O. L. G., Holanda P. C., Testing non-standard neutrino interactions in (anti)-electron neutrino disappearance experiments. arXiv preprint arXiv:2106.15725, 2021