

# Pedro Brandimarte

## Résumé

Background in computational and theoretical physics, and mathematics. I carry extensive experience on scientific software development, with a deep knowledge on algorithms, abstract data structures, hybrid parallel programming and high-performance computing. Much of my career has been devoted to theoretical modeling and development of numerical methods for multi scale simulations applied to nanotechnology. I'm always very enthusiastic about tackling problems out of my comfort zone and working out challenging problems in a cooperative environment.

### Areas of Expertise

#### Programming languages and parallel computing

Advanced PYTHON, C++, C, FORTRAN, MPI, SHELL SCRIPT  
Intermediate R, OCTAVE/MATLAB, OPENMP  
Basic JAVA, RUBY, LUA, CUDA

#### Operating systems

Linux

#### Key competencies

Computational physics, mathematical modeling, research, data analysis, statistics, machine learning, deep learning, algorithms, parallel computing, communication skills

### Key Achievements

#### Research projects and grants

- 2018–2020 **A Novel Platform for Electronics and Quantum Electron Optics Based on Graphene Nanostructures (GRANAS)**.  
grant: Spanish Ministry of Economy, Industry and Competitiveness
- 2010–2014 **Study of the Influence of Localized Vibrational Modes in Charge Transport Properties at Nanoscale Systems**.  
grant: National Council of Technological and Scientific Development - CNPq
- 2006–2007 **CERN (European Organization for Nuclear Research) at ALICE (A Large Ion Collider Experiment)**.  
grant: HELEN program (High Energy Latin American Network)
- 2004–2005 **Vacuum Quantum Noise Squeezing by Polarization Self-rotation**.  
grant: National Council of Technological and Scientific Development - CNPq

#### Academic simulation codes (most relevant)

- 1 **MCMCneuro** (<https://github.com/brandimarte/MCMCneuro>) data driven graph model for neuronal interactions using Bayesian statistics and Markov Chain Monte Carlo. [C, SHELL, R]
- 2 **KPM** (<https://github.com/brandimarte/kpm>) kernel polynomial method implementation using Chebyshev expansion for disordered lattices. [FORTRAN95, MPI]
- 3 **PhOnonS ITeratIve VIBRATIONS** (<https://github.com/brandimarte/vibrations>) for vibrational and electron-phonon coupling analysis via first-principles. [C, SHELL]
- 4 **Inelastic Disorder** (<https://github.com/brandimarte/idisorder>) for transport on devices with random defects and inelastic scattering. [FORTRAN95, C++, MPI, CUDA]
- 5 **Inelastic SMEAGOL** (<https://bitbucket.org/brandimarte/smeagol-2.0> - closed access) for *ab initio* inelastic electronic transport of atomic scale devices. [FORTRAN95, MPI, OPENMP]
- 6 Contributor of **SIESTA/TranSIESTA** codes (<http://departments.icmab.es/leem/siesta>) for *ab initio* electronic structure and transport simulations. [FORTRAN, MPI, OPENMP]

## Work Experience

- 2021–present **Huawei Technologies, France.**  
Parallel computing / Accelerator programming research at Paris Research Center.
- 2020–2021 **Alerion Tec, Spain.**  
Software Engineer on computer vision, parallel imaging processing, autonomous localization and mapping.
- Postdoctoral researcher**
- 2017–2020 **Donostia International Physics Center - DIPC, Spain.**  
Electronic structure and quantum transport in graphene-based nanostructures and networks.  
**funding:** DIPC Foundation
- 2015–2017 **Centro de Física de Materiales - CFM, Spain.**  
Development of tools and theoretical models for studying electron transport in nanoscale devices.  
**funding:** European Commission, 7<sup>th</sup> Framework Programme, ICT Collaborative project
- Scientific training**
- 2006–2007 **CERN - European Organization for Nuclear Research, Switzerland,** ALICE experiment.  
Development on the AliRoot framework for simulation at the ALICE Off-line group (950h).  
**funding:** European Commission, programme América Latina - Formación Académica (ALFA)
- 2004–2005 **Universidade de São Paulo, Brazil,** Coherent Manipulation of Atoms and Light Laboratory.  
Development of a magneto-optical trap experiment.  
**funding:** National Council of Technological and Scientific Development (CNPq/PIBIC)
- Supervision**
- 2019 **Donostia International Physics Center - DIPC, Spain,** Supervisor.  
Electronic properties and tight-binding parametrization of twisted bi-layer graphene.  
**student:** Itsaso Blanco, University College London, Faculty of Maths and Physical Sciences.
- 2018 **Donostia International Physics Center - DIPC, Spain,** Supervisor.  
Code development for evaluating bond order of graphene-based structures via graph theory.  
**student:** Amaia Juaristi Arrizabalaga, Universidad del País Vasco, Departamento de Matemáticas.
- Teaching**
- 2008 **Educafro, Cohab de Taipas and Cohab Brasilândia.**  
Teacher of physics and mathematics (volunteer).
- 2004–2005 **Universidade de São Paulo, Brazil,** Instructor.  
Experimental Physics III and IV.

## Education

- 2008–2014 **Ph.D. in Physics, Universidade de São Paulo, USP, Brazil.**  
Study of the influence of localized vibrational modes in charge transport properties at nanoscale systems.
- 2002–2007 **Bachelor in Physics, Universidade de São Paulo, USP, Brazil.**
- Complementary education**
- 2009–2014 **Bachelor in Applied and Computational Mathematics, Universidade de São Paulo, USP, Brazil.**  
Concluded 65% of the courses (1350h).

## Languages

- |            |               |  |
|------------|---------------|--|
| Portuguese | Mother Tongue |  |
| English    | Fluent        | Understand well, speak well, read well, write well             |
| Spanish    | Advanced      | Understand well, speak well, read well, write well             |
| French     | Intermediate  | Understand well, speak reasonably, read well, write reasonably |

## Scientific Production

Author of **17** publications in high-quality peer-reviewed journals, **11 as first theory author**, with average impact factor **8.64** and all in **Q1** (citation metrics at [scholar.google.com/citations?hl=en&user=P-rSYmoAAAAJ](https://scholar.google.com/citations?hl=en&user=P-rSYmoAAAAJ)). Reviewer of scientific journals, including *ChemistrySelect*, *Physica Status Solidi*, *The Journal of Physical Chemistry*, *Journal of Physics. Condensed Matter*, and *The European Physical Journal*. Attended and presented work in scientific conferences/workshops worldwide (Germany, Hong Kong, USA, Spain, Denmark, Austria and Brazil), whose complete list can be found at [lattes.cnpq.br/8885012919924529](https://lattes.cnpq.br/8885012919924529).