

# Pedro Brandimarte

## Résumé

Background in computational and theoretical physics, and mathematics. I've been working mostly on theoretical modeling and on the development of numerical methods for multi scale simulations applied to nanotechnology. I carry extensive experience on scientific software development, with a deep knowledge on algorithms, abstract data structures, hybrid parallel programming and high-performance computing. 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

- 2020–present **Alerion Tec, Spain.**  
Software Engineer
- 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>o</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	<i>Understand well, speak well, read well, write well</i>
Spanish	Advanced	<i>Understand well, speak well, read well, write reasonably</i>
French	Intermediate	<i>Understand well, speak reasonably, read well, write reasonably</i>

## Scientific Production

Author of **16** publications in high-quality peer-reviewed journals, **10 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).