

Short CV of Nerea Zabala

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Other affiliations

- Institution: Donostia International Physics Center (*DIPC*)

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- Institution: Center of Materials Physics, CFM, joint center CSIC-UPV/EHU

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Academic Background

- B.S. Physics (Solid State Physics), University of the Basque Country (UPV-EHU), 1986
- M.S Thesis: University of the Basque Country (UPV-EHU), 1986

Title: “Temperature study in metallic amorphous ribbons under flash-annealing”

Supervisor: J.M. Barandiaran

- Ph D Thesis, Physics, University of the Basque Country (UPV-EHU), 1991

“Energy loss Scanning Transmission Electron Microscopy“ (in spanish and basque)

Supervisor: P.M. Echenique.

Professional Background

- Teaching assistant, FCT-ZTF, UPV-EHU, 1987
- Assistant Professor, FCT-ZTF, UPV-EHU, 1988
- Associate Professor, FCT-ZTF, UPV-EHU, 1993
- Postdoctoral fellow, Helsinki University of Technology (Aalto University), Finland (6 months) 1997.
- Scientific staff member of Donostia International Physics center (DIPC), 2000-.
- Visiting Professor, Helsinki University of Technology (Aalto University), Finland, (6 months) 2003
- Scientific staff member of Materials Physics Center, joint CSIC-UPV/EHU, 1999-.

Honors and Awards

- Outstanding PhD Thesis Award in Experimental Sciences, UPV/EHU, 1993

- Postdoctoral Fellowship, MEC (Spanish Ministry of Science and Education), Helsinki University of Technology, HUT, hosted by Prof. R.M. Nieminen, 1997
- Visiting Professor, Fellow at HUT, hosted by Prof. M. Puska, 2003.
- Credential for University Full Professorship by spanish ANECA agency, April 2013
- Excellence award for the profesional trajectory by the University Basque Agency UNIBASQ, 2016.
- Excellence Teaching Award, DOZENTIAZ program, UPV-EHU, 2017.

Administrative and professional activities

- Academic secretary of the Department of Electricity and Electronics, UPV-EHU, 1994-95 and 2008-2010.
- Head of the Academic Board of the Degree in Physics, Faculty of Science and Technology, UPV/EHU, 2010-2012.
- Coordinator of the project “Física e IE en Acción- FIEZBlai “ to orient high school students towards Physics and Electronic Engineering careers, since 2009.
- Member of scientific organizations: IOP (Institute of Physics), Elhuyar and UEU (basque).
- Member of 5 different boards of the Faculty of Science and Technology (2010-2017).
- Member of the Permanent Board of CFM, CSIC-UPV, since 2016.
- Member of the committee for the evaluation of 21 PhD thesis in Physics and Materials Science (19 in the University of the Basque Country , 1 in the University Paul Savatier of Toulouse, France and 1 as preexaminer in Aalto University, Finland).
- Regular member of committees to evaluate Master Thesis and Bachelor in Physics Projects in the Faculty of Science and Technology in the UPV-EHU.
- Member of the committees to evaluate the competence of several candidates for Adjunct Professorships, Associate Professorships in different spanish universities.
- Member of the committees to evaluate the competence of several candidates for Researcher Positions in the Spanish Research Council CSIC .
- Recurrent reviewer of several international journals on Physics, Materials Science and Nanoscience and Nanotechnology.
- Organizer of the “PhD student seminar series” at CFM, CSIC-UPV, for PhD students enrolled in the program “Physics of Nanostructures and Advanced Materials”, 2013-2018.
- Outreach activities: participation in “The Science Week”, “Elhuyar Zientzia Azoka”, activities to orient students about the Physics career, interviews in local radios (EiTB), blogs as “Zientzia Kaiera”, etc...

Teaching

- About 24 ECTS/academic year (1989-2010) and 12 ECTS/year since 2010.
- 10 different courses for undergraduates in the Faculty of Science and Technology, UPV-EHU (1989-present): Electricity and Optics, General Physics, Mechanics and waves, Electricity and Magnetism, Electromagnetism I, Electromagnetism II, Laboratory of Electricity and Magnetism, Experimental Techniques in Physics II, Electrodynamics and also Materials Physics II (Laboratory of Physics, Helsinki University of Technology 2003)
- 6 courses for graduates: in PhD program “Physics of Nanostructures and Advanced Materials” and “Master in Nanoscience” (since 2005) and in “Master in new Materials” (2009-10), and “Master in Physics and Technology of Materials” at UPV-EHU

Main research interests

- Plasmon excitation in nanostructures in Electron Microscopy, Electron Energy Loss (EEL) in Electron Microscopy, (theory); Electronic structure, dynamical properties and transport properties in nanostructures: nanowires, overlayers and supported nanostructures with Density Functional Theory (DFT).
- Currently my research is focused on Plasmonics in nanostructures, within the group of Theory of Nanophotonics at the joint center CSIC-UPV/EHU(<http://cfm.ehu.es/nanophotonics/>). Most cited contributions in the fields of electronic transport and optical response of metallic and hybrid nanostructures.
- Present projects: Plasmonic nanoantennas, Quantum vs classical approaches in the excitation of metallic nanoparticles by light and electron beams and hybrid plasmonic metasurfaces for active control in the visible and infrared.

Research activity

Publications

- Over **90** publications, including refereed journal articles (62 JCR), referenced conference proceedings and books.
- Over **90** communications to international conferences and 18 seminars and invited talks.
- Member of the organizing committee of two international conferences (*12th Werner Brandt international conference on the penetration of charged particles in matter*, San Sebastian, 4-7 September 1989 and "*Workshop on Metamaterials for microwave and optical applications*", San Sebastian 18-20 July, 2005

Project Funding:

- Participation in 37 funded research projects since 1989, 4 funded by the European Union, 11 by the Spanish Ministry of Science and Education, and 22 by the Basque Government and the University of the Basque Country. PI (with FJ Aizpurua) of the research group Q-NANOFOT (A classification, ref. IT1164-19) of the basque research system.

Student supervision:

- 5 PhD thesis supervised (Eduardo Ogando 2004, Olalla Pérez González 2011, and Asier Zugarramurdi 2012) and 2 PhD in progress (Mattin Urbieto, started 2016 and Bruno Candelas starting 2019).
- Supervising one postdoc Fellow (Luca Bergamini), 2015
- Supervisor of 6 Master Thesis and 15 Bachelor Projects in Physics.

Selected publications (10):

1. "Theory of energy loss in Scanning Transmission Electron Microscopy of Supported Small particles" A. Rivacoba, N. Zabala and P.M. Echenique, *Physical Review Letters* 69, 3362 (1992)
2. "Spontaneous magnetization of simple metal nanowires" N. Zabala, M.J. Puska and R.M. Nieminen, *Physical Review Letters* 80, 3336-39 (1998)
3. "Image potential in Scanning Transmission Electron Microscopy" A. Rivacoba, N. Zabala and J. Aizpurua, *Progress in Surface Science*, vol. 65, n. 1-2, 1-64 (2000)

4. “The Cherenkov effect as a probe of photonic nanostructures”, F.J. García de Abajo, A. G. Pattantyus-Abraham, N. Zabala, A. Rivacoba, M.O. Wolf and P.M. Echenique *Physical Review Letters* 91, 143902 (2003)
5. “Quantum size effects in Pb islands on Cu(111): Electronic structure calculations” E. Ogando, N. Zabala, E.V. Chulkov and M.J. Puska, *Physical Review B* 69, 153410 (2004)
6. “Lifetimes of quantum well states and resonances in Pb overlayers on Cu(111)” A. Zugarramurdi, N. Zabala, V. M. Silkin, A.G. Borisov, and E.V. Chulkov, *Physical Review B* 80, 115425 (2009)
7. “Optical Spectroscopy of Conductive Junctions in Plasmonic Cavities”, O. Pérez-González, N. Zabala, A.G. Borisov, N.J. Halas, P. Nordlander and J. Aizpurua *Nanoletters* 10, 3090-95 (2010)
8. “Nanoantenna-Based Magnetoplasmonic Crystals for Highly Enhanced and Tunable Magneto- Optical Activity”, Nicolò Maccaferri, Luca Bergamini, Matteo Pancaldi, Mikolaj K. Schmidt, Mikko Kataja, Sebastiaan van Dijken, Nerea Zabala, Javier Aizpurua, and Paolo Vavassori, *Nanoletters* 16, 2533-42 (2016)
9. “Antenna-assisted picosecond control of nanoscale phase transition in vanadium dioxide” O.L Muskens, L. Bergamini, Y. Wang, J. M Gaskell, N. Zabala, CH de Groot, D.W Sheel and J. Aizpurua *Light: Science & Applications* (2016) 5, e16173; doi:10.1038/lsa.2016.173
10. “Atomic-Scale Lightning Rod Effect in Plasmonic Picocavities: A Classical View to a Quantum Effect” M. Urbieto, M. Barbry, Y. Zhang, P. Koval, D. Sánchez-Portal, N. Zabala and A. Aizpurua, *ACS Nano* 12 (1), 585-595 (2018).

Research stays:

Microstructural Physics Group, Cavendish Laboratory, *Cambridge*, U.K., 1 month, 1990, hosted by Prof. A. Howie

Physics Laboratory, *Helsinki* University of Technology (Aalto University) Finland, 5 month 1997, 2 weeks 1998, 1 week 1999, 6 months 2003, hosted by Profs. JM Puska and RM Nieminen