

Nathalie Casanova Morales

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Interdisciplinary researcher working at the interface between physics, biology and biochemistry.

Profile

Experience Experimental Physics, Materials Science, Biophysics, Alzheimer Nanosensor, Soft Matter, Single Molecule, Optical Tweezers, Biochemistry, Nanotechnology, Nanorheology, Image processing, Programming Matlab, Malaria, Cancer Cell, Cell Culture.

Skills Experimental setups, Experimental design, Management and resources required for experimental activities.

Work Experience

Present **Assistant Professor**, *Core Ciencias*, Universidad Adolfo Ibáñez, Peñalolén, Chile

2019– 2020 **Teaching Professor**, *Core Ciencias*, Universidad Adolfo Ibáñez, Peñalolén, Chile

2018– 2019 **Instructor**, *Physics Introduction Course through active teaching methods*, Universidad Técnica Federico Santa María, Vitacura, Chile

2018 **Instructor**, *Electromagnetism Laboratory*, Universidad Adolfo Ibáñez, Peñalolén, Chile

2018 **Research, Concurso Innovación Docente UAI**, *Development of didactic material for electromagnetism lectures*, Universidad Adolfo Ibáñez, Peñalolén, Chile

2016– 2018 **Postdoctoral in Physics**, *Fluid structure interactions at the microscale: A novel way to produce sprays and emulsions.*, Universidad Adolfo Ibáñez, Peñalolén, Chile
Project Manager: Andrés Concha

2017 **Postdoctoral in Physics**, *Mechanical characterization of the immunoglobulin binding protein (bip) by Nanorheology*, University of California, Los Angeles, Los Angeles, United States
Project Manager: Giovanni Zocchi

2016– 2017 **Postdoctoral in Biochemistry**, *Development of single molecule experiment with optical tweezers related with the BIP protein*, Universidad de Chile, Santiago, Chile
Project Manager: Christian Wilson

2013–2015 **Postdoctoral in Biophysics**, *Nano-devices for high precision measurements in biology and nano-structured materials for biomedicine. Proyecto Anillo ACT1108*, Instituto de Física, Pontificia Universidad Católica de Chile, Santiago, Chile
Project Manager: Jerónimo Maze

Responsible for generating connections and effective cooperation between different project disciplines such as physical chemistry and biophysics. Also responsible for carrying out the multidisciplinary experiments .

2010–2012 **PhD**, *title: Contribution to the understanding of red blood cell invasion by Plasmodium falciparum: study of parasites motility on rigid substrates*, L2C, Université UM2, CNRS, Montpellier, France
Supervisors: Gladys Massiera, Catherine Braun-Breton

Kinematic description of the malaria parasite on hard surfaces, contribution to the understanding of movement performed by the parasite to spread the disease in the body to invade red blood cells.

- 2010 **Engineering thesis**, title: *Estudio del movimiento del parásito Plasmodium falciparum en estado de merozoite*, Non-linear Physics Laboratory, Universidad de Santiago de Chile, L2C, Université UM2, CNRS, Santiago-Chile, Montpellier-France
Supervisors: Roberto Bernal y Francisco Melo
Learning culture techniques for malaria parasite. First approach to the description and observation in vivo motion of the parasite responsible for the most severe malaria.
- 2009 **Analyst of Images**, *Implementation of a program to characterize the type of movement of the carcinogenic cells B16-F10; neurons marked with Q-dots and bacterium Proteus Mirabilis; Software used MATLAB*, Laboratorio SCIAN, Programa de Biología del Desarrollo Facultad de Medicina de la Universidad de Chile, Santiago, Chile
Supervisor : Steffen Härtel
- 2008 **Research Assistant**, *Optimization and calibration of the experimental setup to visualize the action of an oscillatory flow on an axón*, Proyecto DICYT N°040831BV , Laboratorio de física no lineal, Universidad de Santiago de Chile, Santiago, Chile
Supervisor: Dr. Roberto Bernal.
- 2007 **Undergraduated Research Assistant for CIMAT**, *Scientific initialization in Biophysics*, Laboratorio de física no lineal, Universidad de Santiago de Chile, Santiago, Chile
Supervisor: Dr. Francisco Melo

Education

- 2021–2022 **Diploma in Learning and Teaching in University Education**, *Diplomado en aprendizaje y enseñanza en educación superior*, Dirección de Docencia, Universidad Adolfo Ibáñez, Santiago, Chile
- 2018–2020 **Diploma in University Education** , *Diplomado en Docencia Universitaria*, Dirección de Enseñanza y Aprendizaje, Universidad Técnica Federico Santa María, Santiago, Chile
- 2010– 2012 **Ph.D in Physics**, *Laboratoire Charles Coulomb (L2C)*, Université Montpellier 2 (UM2), Montpellier, France
- 2008–2010 **Physical Engineer, major in Materials Science**, *Departamento de Física, Facultad de Ciencias, Universidad de Santiago de Chile* , Santiago, Chile
- 2004–2008 **Bachelor in Applied Physics**, *Departamento de Física, Facultad de Ciencias, Universidad de Chile*, Santiago, Chile

Awards and Recognitions

- 2023 **Selected as a young scientist for the TWAS Affiliated Members in 2023 serving a six-year term**, *The World Academy of Sciences (TWAS)*, UNESCO
- 2022 **Member of Sigma Xi**, *Sigma Xi, The Scientific Research Honor Society*

Publications

- 2024 **Towards the understanding of molecular motors and its relationship with local unfolding**, *Quarterly Reviews of Biophysics*, impact factor ranking: Q1, <https://doi.org/10.1017/S0033583524000052>
- 2022 **Determination of protein–protein interactions at the single-molecule level using optical tweezers**, *Quarterly Reviews of Biophysics*, impact factor ranking: Q1, <https://doi.org/10.1017/S0033583522000075>
- 2020 **Study of Nitrogen implantation in Ti surface using Plasma Immersion Ion Implantation technique (PIII) as biocompatible substrate for artificial membranes**, *Materials Science & Engineering C*, impact factor ranking: Q3 , <https://doi.org/10.1016/j.msec.2020.111002>

- 2019 **Structure characterization of the structure of the saxitoxin-targeting Handy aptamer using optical tweezers and molecular dynamic**, *Plos One*, impact factor ranking: Q2, doi: <https://doi.org/10.1371/journal.pone.0222468>
- 2018 **Peptide funcionalization of stable fluorescent nanodiamonds towards reliable detection of beta amyloid**, *Journal of Nanobiotechnology*, impact factor ranking: Q1 , doi:10.1186/s12951-018-0385-7
- 2018 **Mechanical properties of BiP protein determined by nano-rheology**, *Protein Science*, impact factor ranking: Q1 , doi:10.1021/acs.jpcc.7b12782
- 2018 **Identifying Chaotropic and Kosmotropic Agents by Nanorheology**, *J. Phys. Chem. B*, impact factor ranking: Q3, doi:10.1021/acs.jpcc.7b12782
- 2017 **Single-molecule force spectroscopy measurements of Thy-1/ $\alpha v \beta 3$ -integrin interaction using nonpurified proteins**, *Mol.Biol.Cell*, impact factor ranking: Q3, doi:10.1091/mbc.E17-03-0133

Other Publications

- 2018 **Mechanical properties of chaperone BiP, the master regulator of the endoplasmic**, *Book chapter*, ISBN 978-953-51-6401-2

Patents

- 2019 **Nanodiamantes fluorescentes estables para la detección de biomarcadores de la enfermedad de alzheimer**, WO2021022387A1

Conferences and Schools

- Oct. 2022 **Girls in quantum** , *Chile*
- June 2021 **Círculo de Divulgación Científica – CDC** , *Chile*
- Sep. 2020 **Woman in Quantum II: Quantum from the South.**, *United States-Chile*
- Oct. 2019 **DAG Open Day UNAB: Computing and quantum sensors, a chilean experience.**, *Santiago, Chile*
- Oct. 2019 **Misión IBM 2019. Women innovation panel, with the heart in the cloud**, *Santiago, Chile*
- Oct. 2017 **XL annual meeting of the Society for Biochemistry and Molecular Biology of Chile**, *Puerto Varas, Chile*
- Dic. 2016 **XX Simposio Chileno de Física 2016**, *Chilean Physics Symposium*, Santiago, Chile
- Sep. 2015 **2°Workshop Biofísica 2015** , *Biosensores, Dinámica molecular, Nanopartículas de interés biomédico, Biomateriales* , Viña del mar, Chile
- June 2015 **Nanotech France 2015 Conference & Exhibition**, *Multidisciplinary Congress of Nanotechnology*, Paris, France
- Dec. 2014 **Encuentros ChileGlobal 2014**, *Chilean event that brings together researchers linked to Chile from all areas of knowledge*, Santiago, Chile
- Nov. 2014 **XIX Simposio Chileno de Física 2014**, *Chilean Physics Symposium*, Concepción, Chile
- Nov. 2014 **Copec UC Nanotecnología**, *New opportunities for innovation and entrepreneurship*, Santiago, Chile
- Sept. 2014 **Workshop Biofísica 2014**, *Biophysics: A Multidisciplinary assembly* , Santiago, Chile
- Sept. 2014 **III Congreso Nacional de Nanotecnología**, *National Congress of Nanotechnology*, Puerto Varas, Chile
- March 2014 **5th BioNanoMed 2014**, *Congress dedicated to Nanotechnology, Medicine and Biology*, Krems, Austria

- Dec. 2013 **VI Escuela de NanoEstructuras**, *School of nanostructures*, Valparaiso, Chile
- Sept. 2012 **PhysCell2012**, *EMBO conference physics of cell: from soft to living matter*, Hyères, France
- Sept. 2012 **PhysCell2012**, *Pierre-Gilles de Gennes advanced school on cellular biophysics*, Hyères, France
- May 2011 **The Biology and Pathology of the Malaria Parasite**, *7th Conferencia anual BioMalPar*, Heidelberg, Germany
- May 2011 **Imaging Malaria Parasites**, **University of Heidelberg**, Heidelberg, Germany
- Feb. 2009 **I escola de verão, PUC Rio**, *School of Materials Science*, Rio de Janeiro, Brazil

Outreach

- Oct.2023 **Liceo San Isidro**, *Charla de la semana de la ciencia*, La Cruz, Chile
- Oct.2023 **Colegio Unión Nacional Arabe**, *VII muestra científica Unión Nacional Arabe*, Peñalolen, Chile
- Oct.2022 **5° Aniversario de Frutillar ciudad creativa**, *Escucha y observa las ondas*, Frutillar, Chile
- Oct.2022 **Colegio Unión Nacional Arabe**, *VI muestra científica Unión Nacional Arabe*, Peñalolen, Chile
- August.2021 **Talento Peñalolen**, *Presentation my scientific investigation for students in Peñalolen*, Santiago, Chile
- Oct.2020 **Round table STEM**, *Round Table with school students about the importance of STEM*, Concepción-Santiago, Chile
- Nov.2018 **#ChileCuántico**, *Programming course in IBM Quantum computer for school students*, Santiago, Chile
- Nov.2017 **#ChileCuántico**, *Programming course in IBM Quantum computer for university students*, Santiago, Chile
- Jan.2016 **Cuidado la luz te puede atrapar**, *Presentation of light and optical tweezers*, Santiago, Chile
- Oct. 2015 **XX Semana de la Ciencia**, *Science for children and youth in the region of Aysen*, Coyhaique, Chile
- Oct. 6-10 **1000 Científicos 1000 aulas**, *Science for children and youth in the region of Magallanes*,
2014 Punta Arenas, Chile