



Karen CAICEDO

Ph.D. in Physics



About

SUBSTITUTE DECLARATION OF CERTIFICATION (Articles 46 and 47 of Presidential Decree 445/2000)

I, the undersigned, Karen Caicedo, aware that false statements are subject to the penal sanctions provided for by Article 76 of Presidential Decree 445/2000, declare that the information reported in the following curriculum vitae is true.

I have a Ph.D. in physics with more than 3 years of research experience on 2D and 3D super-resolution microscopy techniques for imaging of biological samples.

Education

Ph.D. thesis: Self-interference 3D localization microscopy in the near-infrared for deep tissue single-particle tracking

Sep 2019 -
Mar 2023

Ph.D. program

Université de Bordeaux

Laboratoire Photonique, Numérique et Nanosciences (LP2N), NanoBioMicroscopy team. Responsibilities:

- Design and construction of super-resolution microscopy systems for 2D and 3D single-molecule localization in biological tissues at depth
- Theoretical studies on signal sampling to achieve super-resolution
- Optimization signal-to-noise ratio in optical microscopy setups
- Correction of optical aberrations
- Studies of optical systems' resolution and its dependency on the photon budget and off-axis point sources
- Image processing
- Edition of someone else's script used for 3D localization and extraction of diffusion information
- Organotypic cultures and carbon nanotubes incubation
- 3D single-particle tracking of carbon nanotubes in organotypic brain slices at depth
- Simulation of vectorial point spread functions produced by given optical systems

Sep 2018 -
Jun 2019

Master program in Lasers, Matter and Nanoscience

Université de Bordeaux

Main subjects covered: biophotonics, nanophysics, biophysics, non-linear optics, lasers, quantum optics, statistical physics, nanoelectromechanics.

Jan 2014 -
May 2018

Bachelor in Physics

Universidad San Francisco de Quito (USFQ)

Research experience

Nov 2023 -
ongoing

Research assistant

USFQ

Theoretical description of a gain-assisted metallic nanoparticle below and above the gain threshold. Experimental research on Raman-tweezers setup.

Feb 2019 -
Jun 2019

Intern

Laboratoire Ondes et Matière d'Aquitaine

Theoretical determination of charge, energy transfer and chemical reaction dynamics of molecules confined in an electromagnetic nanocavity

May 2018 -
Jul 2018

Intern

Centre de Recherche Paul Pascal

Theoretical description of a gain-assisted metallic nanoparticle, and determination of its energy steady states

May 2017 -
Jul 2017

Intern

Centre de Recherche Paul Pascal

Theoretical study of metallic nanoparticles in coupling with a gain medium, and their spaser behavior

Teaching experience

Jan 2024 -
ongoing

Professor

USFQ

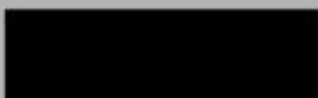
Teacher of undergraduate courses of problem solving on fundamentals of physics, and optics and waves. Teacher of laboratory of electromagnetism, and laboratory of optics and waves. Teacher assistant on quantum mechanics for master level

Jan 2022 -
Jun 2022

Intern supervisor

LP2N

Supervision of master student working with phase masks and their performance characterization for single-molecule localization microscopy applications



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Professional skills –

- Design and construction of single-molecule localization microscopy systems
- Experience with lasers and scientific cameras
- Computational quantitative image data analysis
- LATEX, Python, MatLab, C++, ImageJ, MicroManager, LightField Software, Mathematica, CodeV, Zemax
- Freezing, thawing, passage, amplification of cell cultures
- Fluorescence microscopy in *in vitro* conditions
- UV-visible and fluorescence spectroscopies
- Single-particle tracking, and diffusion studies
- Design and construction of optical tweezers setup
- Design and construction of optical Raman spectroscopy setup
- Theoretical studies on hybrid plasmonic systems (classical and quantum considerations)

Personal skills —

- Organized
- Creative
- Team player
- Adaptable
- Self-management
- Multidisciplinary researcher
- Eager to learn

Languages —

 Spanish	<div><div></div><div></div><div></div><div></div><div></div></div>
 English	<div><div></div><div></div><div></div><div></div><div></div></div>
 French	<div><div></div><div></div><div></div><div></div><div></div></div>

Aug 2016 -	Undergraduate Teaching Assistant	USFQ
Sep 2017	Teacher of electromagnetism problem solving	
Mar 2016 -	Assistant of the Coordinator of Physics	USFQ
May 2016	Responsible for writing minutes of teacher meetings	

Journal publications

- **A. Aradian, A. Cathey, K. Caicedo, M. Mora, M. Infusino, and A. Veltri.** Gain enhanced metal nanoshells: below and above the emission threshold. *In preparation*.
- **Q. Gresil, A. Lee, O. Lévêque, K. Caicedo, B. Martín Muñoz, C. Kulcsár, F. Goudail, P. Bon, L. Cognet.** 2023. A binary annular phase mask to regulate spherical aberration and allow super-localization in single-particle tracking over extended depth-of-focus. *Optics Communications*, Vol. 545, <https://www.sciencedirect.com/science/article/abs/pii/S0030401823004479>
- **S. Nandi, K. Caicedo, L. Cognet.** 2022. When super-resolution localization microscopy meets carbon nanotubes. *Nanomaterials*, Vol. 12, <https://doi.org/10.3390/nano12091433>
- **K. Caicedo, A. Cathey, M. Infusino, A. Aradian, and A. Veltri.** 2022. Gain-driven singular resonances in active core-shell and nano-shell plasmonic particles. *J. Opt. Soc. Am. B*, Vol. 39, Iss. 1, pp. 107-116, <https://opg.optica.org/josab/abstract.cfm?URI=josab-39-1-107>
- **L. Mauro, K. Caicedo, G. Jonusauskas, and R. Avriller.** 2021. Charge-transfer chemical reactions in nanofluidic Fabry-Pérot cavities. *PHYSICAL REVIEW B*, Vol. 103, Iss. 16, <https://doi.org/10.1103/PhysRevB.103.165412>

Events and conferences

- **K. Caicedo, A. Lee, P. Bon, L. Cognet.** Self-interference 3D localization microscopy in the near-infrared for deep tissue single-particle tracking. SPIE Photonics Europe. 2022. Strasbourg, France. Oral.
- **K. Caicedo, A. Lee, P. Bon, L. Cognet.** Self-interference 3D localization microscopy in the near-infrared for deep tissue single-particle tracking. Webinar GDR ondes. 2021. Oral.
- **K. Caicedo, A. Lee, P. Bon, L. Cognet.** Self-interference 3D localization microscopy in the near-infrared for deep tissue single-particle tracking. Focus on Microscopy (FOM). 2021. Videoconference. Oral.
- **K. Caicedo, A. Cathey, A. Aradian, A. Veltri.** Intensity steady state and harmonic field of a gain-assisted silver nanoshell. Discussions on Nano & Mesoscopic Optics (DINAMO). 2019. Galapagos Islands, Ecuador. Poster.
- **K. Caicedo, R. Avriller.** Chemical reactivity of molecules strongly coupled to an electromagnetic cavity mode. Discussions on Nano & Mesoscopic Optics (DINAMO). 2019. Galapagos Islands, Ecuador. Poster.

References

- **Alessandro Veltri, Ph.D.** Current supervisor. aveltri@usfq.edu.ec
- **Melissa Infusino, Ph.D.** Current supervisor. minfusino@usfq.edu.ec
- **Pierre Bon, Ph.D.** Doctorate co-supervisor. pierre.bon@xlim.fr
- **Benjamin Lambert, Ph.D.** Doctorate colleague. benjamin.lambert@institutoptique.fr