

# Fernando Caballero

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Department of Physics, University of California, Santa Barbara, CA, USA | fmc36@ucsb.edu

## Research experience

- Internship at the CSIC in Madrid, in the Biophysics of Macromolecular Systems group between December 2014 and March 2015, on the topic of agent based and celular automata models for the study of Chagas' disease transmission between cells.
- PhD studies at the University of Cambridge, in the Soft Matter group, between October 2016 and March 2020, including collaborations with other researches from in and out of the university on the topic of critical dynamics applied to Active Matter.
- PostDoc at the University of California, Santa Barbara, in the group of Prof. Cristina Marchetti. (2020-2023)

## Teaching experience

- Supervisor of Statistical Physics (3rd year undergraduate course) at the Department of Mathematics, University of Cambridge, during the academic years 17/18 and 18/19.

## Education

### BSC | JUNE 2015 | UNIVERSIDAD COMPLUTENSE DE MADRID

- Undergraduate studies of physics, specialized in theoretical physics and applied mathematics, with a dissertation on public key cryptography over elliptic curves supervised by Dr. Piergiulio Tempesta.

### MASTER | JUNE 2016 | UNIVERSITY OF CAMBRIDGE

- Master of Advanced Studies in Applied Mathematics and Theoretical Physics, with specialization in Theoretical Physics and a dissertation about Tensor Renormalization Group supervised by Dr. Matthew Wingate.

### PHD | JUNE 2020 | UNIVERSITY OF CAMBRIDGE

- PhD topic: Critical dynamics of active phase separation: A scalar field theory approach.
- Supervised by Prof. Michael E. Cates at the Department of Applied Mathematics and Theoretical Physics, University of Cambridge, June 2020.

## Publications

- Caballero F., Nardini C., van Wijland F. and Cates M. E. **Strong coupling in conserved surface roughening: a new universality class?** *Phys. Rev. Lett.* 121 020601 (2018).
- Caballero F., Nardini C. and Cates M. E. **From bulk to microphase separation in scalar active matter: a perturbative renormalization group analysis** *J. Stat. Mech.* 123208 (2018).
- Caballero F., Cates M. E. **Stealth entropy production in active field theories near Ising critical points** *Phys. Rev. Lett.* 124 240604 (2020)
- Adhikari R. et al **Inference, prediction and optimization of non-pharmaceutical interventions using compartment models: the PyRoss library** (*arXiv:2005.09625*)
- Caballero F. and Marchetti M. C. **Activity Suppressed Phase Separation** (*arXiv:2206.12574*)

- Tayar A. M., Caballero F., Anderberg T., Saleh O. A., Marchetti M. C., Dogic Z. **Controlling liquid-liquid phase behaviour with an active fluid** (arXiv:2208.12769)
- You Z., Caballero F., Marchetti M.C. **Vorticity phase separation and defect lattices in isotropic active nematics** (in preparation)

## Participation in conferences and talks given

- *Chair of the Mathematics master student conferences at the University of Cambridge, in the academic years 16/17, 17/18 and 18/19.*
- Talk given at group seminars at the Department of Applied Mathematics, University of Cambridge (October 2018) titled *Renormalization Group analysis of scalar field theories out of equilibrium.*
- Talk given at Edwards Centre meeting at University of Cambridge (March 2018) on *New universality classes in non-equilibrium systems.*
- *Poster presented at StatPhys27 (Buenos Aires, July 2019) titled Critical dynamics of active field theories.*
- *Invited talk at BPPB seminar series at Rochester Institute, December 2021, titled “Activity suppressed phase separation in binary mixtures”*
- *Contributed talk at APS March Meeting 2022 titled “Active mixing of phase separating mixtures”.*
- *Invited talk at Engineering Life 2021 conference in Dresden (June 2022) titled “Activity suppressed phase separation”.*
- *Contributed talk at APS March Meeting 2023 titled “Interface dynamics of active/passive mixtures”.*

## Prizes

- Smith-Knight Rayleigh-Knight prize essay competition, Grade 2 winner, January 2017.

## Technical experience

- Experience in several programming language, specially C/C++, applied to simulating physical systems as well as general programming.
- Experience in working with GNU/Linux systems.

## Language certificates

- Spanish: L1
- English: IELTS passed in 2016 with an average of 7.5 (C2 level)
- Russian: C1 level (March 2020)