

Curriculum Vitae

EDUARDO HENRIQUE COLOMBO

PERSONAL INFORMATION

NAME: Eduardo Henrique Filizzola Colombo
BIRTH: Rio de Janeiro, Brazil | January 8, 1988
NATIONALITY: Brazilian; Italian.
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I'm a physicist interested in the macroscopic phenomena that emerge in biological populations, focusing on topics such as population survival in heterogeneous environment, self-organization and ecosystem diversity. Currently, I am a Postdoctoral Research Associate working under the supervision of professors Corina Tarnita (Department of Ecology and Evolutionary Biology, Princeton University) and Juan Bonachela (Department of Ecology, Evolution, and Natural Resources, Rutgers University)

EDUCATION

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| 2014 - 2018 | Doctoral degree in Physics, PUC-RIO, March 2018.
Advisor: Prof. Celia Anteneodo. Awarded with FAPERJ-Nota10 fellowship for outstanding students. |
| 2012 - 2014 | Master's degree in Physics, PUC-RIO, February 2014.
Advisor: Prof. Celia Anteneodo. Awarded with FAPERJ-Nota10 fellowship for outstanding students. |
| 2007 - 2011 | Bachelor's degree in Physics, PUC-RIO, December 2011. |

PROFESSIONAL ACTIVITY

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| 2020 - | Postdoctoral Research Associate at Department of Ecology and Evolutionary Biology, Princeton University (Princeton, USA). |
| Jun/2018 - 2020 | Postdoctoral researcher at Institute for Cross-Disciplinary Physics and Complex Systems (Palma de Mallorca, Spain). |

FELLOWSHIPS AND GRANTS

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| 2017 - 2017 | CAPES visiting student fellowship/PDSE. Ministry of Science and Technology. |
| 2016 - 2018 | Nota10 fellowship. Research Foundation of Rio de Janeiro State. |
| 2014 - 2016 | CNPq-GD fellowship and grant. Ministry of Science and Technology. |
| 2013 - 2014 | Nota10 fellowship. Research Foundation of Rio de Janeiro State. |
| 2012 - 2013 | CAPES fellowship. Ministry of Education of Brazil. |
| 2009 - 2011 | Scientific initiation fellowship. Ministry of Education of Brazil. |
| 2007 - 2009 | Scientific initiation fellowship. Research Foundation of Rio de Janeiro State. |

LIST OF PUBLICATIONS

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| PREPRINTS | <i>Landscape-induced spatial oscillations in population dynamics.</i> V. Dornelas, E.H. Colombo, C. López, E. Hernández-García. arXiv:2008.02907 (under review in Sci. Rep.).

<i>Critical patch size reduction by heterogeneous diffusion.</i> M.A.F. dos Santos, V. Dornelas, E.H. Colombo, C. Anteneodo, arXiv:2003.00100 (Accepted in Phys. Rev. E). |
| 2019 | <i>Connecting metapopulation heterogeneity to aggregated lifetime statistics.</i> E.H. Colombo. Ecological Complexity 39, 100777. |
| 2019 | <i>Heat flux direction controlled by power-law oscillators under non-Gaussian fluctuations.</i> E.H. Colombo, L. Defaveri, C. Anteneodo. Phys. Rev. E 100, 032118. |

- 2019 *Single-species fragmentation: The role of density-dependent feedbacks.* V. Dornelas, E. H. Colombo and C. Anteneodo. Phys. Rev. E 99, 062225, 2019
- 2019 *Spatial eco-evolutionary feedbacks mediate coexistence in prey-predator systems.* E.H. Colombo, R. Martínez-García, C. López, E. Hernández-García. Scientific Reports 9, 18161.
- 2018 *Nonlinear population dynamics in a bounded habitat.* E. H. Colombo and C. Anteneodo. J. Theor. Biol., v. 446, 11 , 2018.
- 2016 *Population dynamics in an intermittent refuge.* E. H. Colombo and C. Anteneodo. Phys. Rev. E, v. 94, p. 042413, 2016.
- 2015 *Metapopulation dynamics in a complex ecological landscape.* E. H. Colombo and C. Anteneodo. Phys. Rev. E, v. 92, p. 022714, 2015.
- 2014 *Effect of environment fluctuations on pattern formation of single species.* L. A. da Silva, E. H. Colombo, and C. Anteneodo. Phys. Rev. E, v. 90, p. 012813, 2014.
- 2012 *Nonlinear diffusion effects on biological population spatial patterns.* E. H. Colombo and C. Anteneodo. Phys. Rev. E, v. 86, p. 036215, 2012.
- IN PREPARATION *Pulsed signaling as a route to pattern formation.* E.H. Colombo, C. López, E. Hernández-García.

PARTICIPATION IN RESEARCH PROJECTS

- Maria de Maeztu Program for units of Excellence in R&D (2019 -).
- Emergent social, technical and ecological complex systems project. Coordinator: Pere Colet. ESOTECOS FIS2015-63628-C2-2-R (AEI/FEDER,EU) (2018-2019).
- Dinâmica de sistemas complexos. Coordinator: Prof. Celia Anteneodo. APQ1- FAPERJ - E110.369/2014 (2014-2016).
- Dinâmica estocástica em sistemas complexos. Coordinator: Prof. Celia Anteneodo. Ed. Universal, MCT/CNPq 14/2013, 480392/2013-7 (2013-2016)
- Mecânica Estatística, fundamentos, aspectos teóricos e aplicações. Coordinator: Prof. Celia Anteneodo. APQ1 - FAPERJ E26/111.646/08 (2008-2010)
- Problemas em Física Granular. Coordinator: Prof. Welles Morgado. APQ1 -FAPERJ - E26/111.455/2008 (2008-2010).

STAYS ABROAD

APRIL-SEPTEMBER 2017 – Institute for Cross-Disciplinary Physics and Complex systems under supervision of Prof. Emilio Hernández-García (Palma, Spain).

PRESENTATIONS

Invited seminars

- 2020 *Biology from Images.* Complex Systems & Statistical Mechanics ICTP-SAIFR Seminars (São Paulo, Brazil).
- 2018 *Population survival in spatiotemporal environments.* IFISC (Palma, Spain).
- 2015 *Impact of environment spatial structure in population dynamics.* Bio-Rio meeting (Niterói, Brazil).
- 2015 *Metapopulation dynamics: complex habitats and dispersal strategy.* Seminar at Applied Mathematics School at Getúlio Vargas Foundation (Rio de Janeiro, RJ).

Conference participation

Talks

- 2019 *Spatial eco-evolutionary feedbacks mediate coexistence in prey-predator systems.* (contributed talk). Fluctuations, tipping points and emergence in eco-evolutionary dynamics (Leeds, UK).
- 2018 *Species mixing determines predators' optimal perception range and coexistence times in predator-prey dynamics* (contributed talk). Physics and Ecology: Challenges at the frontier (Menorca, Spain).
- 2016 *Metapopulation dynamics and self-organization* (invited talk). International Conference on Structural Nonlinear Dynamics and Diagnosis (Marrakesh, Marroco).
- 2015 *Role of habitat spatial structure and dispersal strategy* (contributed talk). National Meeting of Statistical Physics (Vitória, Brazil).
- 2015 *Metapopulation dynamics in a complex habitat* (contributed talk). Models in Population Dynamics and Ecology (Niterói, Brazil).
- 2014 *The effects of nonlinear diffusion and environment fluctuations in the self-organization of biological populations* (invited talk). III Dynamics days South America (Valparaíso, Chile).
- 2014 *Nonlocality, nonlinear diffusion and environment fluctuations in biological population patterns* (contributed talk). XXXVII Brazilian Meeting on Condensed Matter Physics (Suaípe, Brazil).

Posters

- 2018 *Nonlinear population dynamics in a bounded habitat* (Poster). XXII Congreso de Física Estadística (Madrid, Spain).
- 2017 *Population dynamics in a intermittent refuge* (Poster). Crossroads in Complex Systems (Palma, Spain).
- 2016 *Population dynamics in a intermittent refuge* (Poster). Encontro de Física 2016 (Natal, Brazil).
- 2013 *Nonlinear subdiffusion induces population fragmentation* (Poster). XIII Latin American Workshop on Nonlinear Phenomena (Córdoba, Argentina).
- 2013 *Nonlinear diffusion in biological population* (Poster). Mathematical Methods and Modeling of Biophysical Phenomena (Cabo Frio, Brazil).

COMPLEMENTARY EDUCATION

- 2018 School on Physics Applications in Biology, 40hrs (ICTP – SAI FR, São Paulo, Brazil).
- 2017 VII GEFENOL Summer School on Statistical Physics of Complex Systems, 60hrs (IFISC, Palma, Spain).
- 2017 VI Southern-Summer School on Mathematical Biology, 40hrs (ICTP – SAI FR, São Paulo, Brazil).

SKILLS

Analytic methods for stochastic process; Mathematical modeling; Numerical integration of differential equations; Agent-based computer simulations; Cloud-computations; C, C++ and python programming languages; MATLAB; Maple;

LANGUAGES

English — Understands, speaks, writes and reads well;
Portuguese — Understands, speaks, writes and reads well;
Spanish — Understands and reads well, basic speaking and writing;