

## Celia Blanco, Ph.D.

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### PROFESSIONAL SUMMARY

Theoretical physicist with 10+ years of academic and government research experience. Expertise in mathematical and theoretical modeling, numerical analysis and computational simulations of chemical and biological systems. Extensive experience developing bioinformatic tools for processing and analyzing high-throughput sequence data from a wide range of experimental set ups. Collaborative researcher with a general interest in astrobiology and questions related to the origin and evolution of early life.

### PROFESSIONAL APPOINTMENTS

#### Affiliate Research Scientist

June 2023 – Present

Blue Marble Space Institute of Science, Seattle, WA

Investigating the emergence of the protein translation system by analyzing physicochemical properties of hypothetical primitive genetic codes.

- Developing a Bash and Python pipeline for analyzing, computing metrics and visualizing high-throughput sequencing data from in vitro selections and directed evolution experiments.
- Studying the navigability of simulated fitness landscapes with tunable ruggedness using computational tools.
- Performing a comprehensive re-evaluation of amino acid chronology in early evolution.

#### Assistant Project Scientist

March 2020 – June 2023

Department of Chemical and Biomolecular Engineering, University of California, Los Angeles, CA

- Performed bioinformatic analysis of high-throughput sequencing data from in vitro selections involving reduced alphabet protein libraries.
- Analyzed and modeled protein aggregation data for alpha-synuclein in the presence of aptamers.
- Conceptualized and developed a Python pipeline (DeCatCounter) for processing concatenated PacBio reads from in vitro selection experiments.

#### Postdoctoral Research Scholar

June 2014 – March 2020

Department of Chemistry and Biochemistry, University of California, Santa Barbara, CA

P.I.: Dr. Irene Chen

- Studied biophysical properties of previously identified target peptide sequences which favor good binding to RNA through bioinformatics and molecular dynamics.
- Modeled and simulated bacteriophage-bacteria interactions for the purpose of phage therapy in urinary tract infections.
- Processed and analyzed sequencing data from a wide variety of evolutionary in vitro experiments.
- Conceptualized and developed a Bash and Python pipeline (EasyDIVER) for processing high-throughput sequencing data from in vitro selections and directed evolution experiments.
- Conceptualized and developed a Python tool (ClusterBOSS) for clustering high-throughput sequencing data.

#### Graduate Research Assistant

November 2009 – May 2014

Department of Molecular Evolution, Spanish Astrobiology Center (CAB, CSIC-INTA), Madrid, Spain

Advisor: Dr. David Hochberg

- Designed and tested kinetic models for spontaneous symmetry breaking and amplification in polymerization, copolymerization and crystallization in experimental chemical systems.
- Performed numerical calculations and computational simulations of theoretical chemical systems relevant to the abiotic emergence of chiral asymmetry.
- Participated in multiple multidisciplinary collaborations with laboratories dedicated to experimental chemistry.

## EDUCATION

- 2014 Ph.D., Physics, Universidad Complutense de Madrid, Spain  
"Models for Chiral Amplification in Spontaneous Mirror Symmetry Breaking"  
Cum Laude • Extraordinary Doctorate Award Course 2013/2014.
- 2010 M.Sc., Theoretical Physics, Universidad Complutense de Madrid, Spain
- 2009 B.Sc., Physics (Specializing in Theoretical Physics), Universidad Complutense de Madrid, Spain

## RESEARCH FUNDING

- 2020 – 2025 Co-Investigator in research project: "*Emergence of a complex biochemical system: Evolutionary aspects of the path to coded protein synthesis*"  
NASA ICAR
- 2023 – 2027 Member of research project: "*Construction of a Replicating Evolving Protocell*"  
Sloan Foundation (USA). P.I. Jack Szostak
- 2020 – 2023 Member of research project: "*Collaborative Research: Booting up a Mirror Cell*"  
NSF (USA). P.I. Neal Devaraj
- 2018 – 2024 Member of research project: "*Evolutionary and Chemical Activity Landscapes of RNA*"  
Simons Foundation (USA). P.I. Irene Chen
- 2016 – 2022 Member of research project: "*Understanding How Bacteriophages Affect Wound Ecologies and Developing New Tools to Harness Bacteria-Phage Interactions*".  
NIH (USA). P.I. Irene Chen
- 2016 – 2017 Otis Williams Postdoctoral Fellowship, Santa Barbara Foundation – Budget: \$75,000
- 2013 – 2017 Member of research project CTQ2013-47401-C02-2P: "*Chemical models for the origin of biological homochirality: an integrated theoretical and experimental approach*".  
Ministerio de Ciencia e Innovación (Spain). P.I. David Hochberg
- 2010 – 2012 Member of research project AYA2009-13920-C02-01: "*Experimental and theoretical models for the abiotic emergence of chirality and its detection as the signature for evolutive systems in extraterrestrial materials*".  
Ministerio de Ciencia e Innovación (Spain). P.I. David Hochberg

## SELECTED RESEARCH PRESENTATIONS

- 2023 Origins 2023 (ISSOL/IAU F3) • Quito, Ecuador (Oral presentation)
- 2022 V Symposium of the Interdisciplinary Research Network on Chirality • Mexico (Oral presentation)
- 2022 Astrobiology Scientific Conferences (AbSciCon) • Atlanta, GA, US (Oral presentation)
- 2022 11th Annual Southern California Systems Biology Conference • UCLA, US (Poster)
- 2021 Simons Collaboration on the Origins of Life Annual Symposium • Virtual (Poster)
- 2019 Astrobiology Scientific Conferences (AbSciCon) • Seattle, WA, US (Oral presentation)
- 2019 8th Annual Southern California Systems Biology Conference • UC Irvine, US (Poster)
- 2018 Simons Collaboration on the Origins of Life Annual Symposium • NYC, US (Poster & Presentation)
- 2018 Solvay Workshop Chiral Symmetry Breaking • UCLB, Brussels, Belgium (Poster)
- 2017 Astrobiology Scientific Conferences (AbSciCon) • Mesa, AZ, US (Oral presentation)
- 2017 Simons Collaboration on the Origins of Life Annual Symposium • NYC, US (Poster)
- 2015 Astrobiology Scientific Conferences (AbSciCon) • Chicago, IL, US (Oral presentation)
- 2015 Simons Collaboration on the Origins of Life Annual Symposium • NYC, US (Poster)
- 2015 COST Action CM1304, SysChem2015 meeting • Rolduc Abbey, Netherlands (Poster)
- 2014 Gordon Research Conference: Origins of life • Galveston, Texas, US (Poster)
- 2014 European Winter School on Organic Chemistry • Bressanone, Italy (Poster)
- 2014 1st BCAM Workshop on Nonlinear dynamics in Biological Systems • Bilbao, Spain" (Oral presentation)
- 2012 NASA Astrobiology Institute Focus Group • Granada, Spain (Oral presentation)
- 2012 Nordic-NASA Summer School • Reykjavik, Iceland (Poster)
- 2011 Chirality at the Nanoscale conference • Liverpool, United Kingdom (Poster)
- 2011 Systems Chemistry III conference • Crete, Greece (Oral and poster presentations)

## HONORS AND AWARDS

- 2023 Nominated as an up-and-coming researcher. Selected for invitation by the PCCP Editorial Board to contribute to the 2023 PCCP Emerging Investigators Themed Issue.
- 2020 Travel grant • 2020 AAAS Annual Meeting  
Sponsored by the UCSB Individualized Professional Skills (IPS) Program • Santa Barbara, CA, US
- 2019 Finalist PCCP Emerging Lectureship. Selected for invitation by the PCCP Editorial Board to contribute to the 2020 PCCP Emerging Investigators Themed Issue
- 2018 Marie Skłodowska-Curie fellowship project proposal awarded (without funding)  
Seal of Excellence awarded by the European Commission (H2020-MSCA-IF-2018)
- 2016 Finalist of Harvey L. Karp Discovery Award • UC Santa Barbara, CA, US
- 2016 Otis Williams Postdoctoral Fellowship • UC Santa Barbara, CA, US
- 2014 Scholarship and travel grant • “European Winter School on Organic Chemistry”  
Sponsored by the COST Action CM1304 • Bressanone, Italy
- 2014 Scholarship and travel grant • “Gordon Research Conference: Origins of life”  
Sponsored by the GRC • Galveston, Texas, US, 2014
- 2012 Scholarship • “Nordic-NASA Summer School: Water, ice and the origin of life in the universe”  
Sponsored by the Nordic Network of Astrobiology and NASA • Reykjavik, Iceland
- 2011 Scholarship • “Systems Chemistry” III conference.  
Sponsored by COST Action CM0703 “Systems Chemistry” • Crete, Greece
- 2011 Best Poster Prize • Systems Chemistry III conference  
Sponsored by the Journal of Systems Chemistry • Crete, Greece
- 2011 Best Poster prize • Chirality at the Nanoscale conference  
Sponsored by the Institute of Physics, Thin Films and Surfaces Group • Liverpool, UK
- 2009 Graduate Research Fellowship FPI Calvo Rodés  
Sponsored by the National Institute for Aerospace Technology (INTA)

## PARTICIPATION IN WORKING GROUPS, WORKSHOPS AND ASSOCIATIONS

- 2023 Member of the International Society for the Study of the Origin of Life (ISSOL)
- 2022 Santa Fe Institute (SFI) Workshop ‘New Frontiers in the Origin of Life’
- 2020 Member of the American Association for the Advancement of Science (AAAS)
- 2020 500 Women Scientist, Santa Monica Pod, Los Angeles, CA
- 2019 Santa Fe Institute (SFI) Working Group “Evolving Chemical Systems”  
Sponsored by the NSF Research Coordination Network (RCN) for Exploration of Life’s Origins
- 2012 IV NASA Focus Group Meeting “Thermodynamics, Disequilibrium, and Evolution”  
Sponsored by NASA Astrobiology Institute • Granada, Spain

## COURSES AND CERTIFICATIONS

- 2023 Stablished Researcher (Certificado R3) • Ministry of Science and Innovation of Spain
- 2023 Assistant Professor Certification (Profesor Ayudante Doctor, PAD) • Ministry of Universities of Spain
- 2021 UCLA NSF Responsible Conduct of Research (CITI Program)
- 2020 Introduction to Data Science in Python • University of Michigan (virtual)
- 2020 Applied Plotting, Charting & Data Representation in Python • University of Michigan (virtual)
- 2017 Computational techniques for life sciences • Texas Advance Computing Center, TX, US
- 2016 Using Galaxy for Analysis of RNA-Seq and CHIP-Seq Data • UC Davis, CA, US
- 2015 Data Science Boot Camp • UC Santa Barbara, CA, US
- 2015 Computational Biophysics Workshop • UC Berkeley, CA, US
- 2014 European Winter School on Organic Chemistry • Bressanone, Italy
- 2013 Astrobiology and the Search for Extraterrestrial Life • University of Edinburgh, UK (virtual)
- 2012 Writing in the Sciences • Stanford University (virtual)
- 2012 Nordic-NASA Summer School: Water, ice and origin of life • Reykjavik, Iceland

## **OPEN SOURCE BIOINFORMATIC TOOLS**

- 2022 ClusterBOSS [[GitHub](#)]  
Clustering sequencing data from in vitro selection experiments into families of sequence similarity
- 2021 DeCatCounter [[GitHub](#)]  
Processing concatenated PacBio reads from in vitro selection experiments
- 2020 EasyDIVER [[GitHub](#)]  
Pre-processing HTS reads from in vitro selection experiments

## **PROGRAMMING LANGUAGES AND SOFTWARE**

- Proficient: Python, Shell scripting, Mathematica, LaTeX, Matlab, Microsoft Office.
- Intermediate: AWS, C++, R.

## **SELECTED OUTREACH/MENTORSHIP ACTIVITIES**

- 2023 Primary mentor of Visiting Scholars at Blue Marble Space Institute of Science (BMSIS)
- 2023 Auxiliary mentor of STEM undergraduate students with inSTEM (National Science and Technology Medals Foundation)
- 2023 Member of the NASA Astrobiology Science Communication Guild
- 2023 Invited member to UCSB Career Panel for Postdoc Professional Development program
- 2023 NASA Astrobiology Program High School and College Students Mentor
- 2023 Blue Marble Space Institute of Science (BMSIS) Young Scientist Program (YSP) Mentor
- 2023 Judge at the ENVISION Research Competition by WiSTEM
- 2022 STEM Pals Volunteer (correspondence with 4th-6th grade student interested in STEM)
- 2022 Judge at the ENVISION Research Competition by WiSTEM
- 2020 Educational Materials Translator (Molecular Interactions Materials at Georgia Tech)
- 2019 Student poster presentation judge, Astrobiology Scientific Conferences (AbSciCon) • Seattle, WA, US
- 2019 Science outreach activities with Family Ultimate Science Exploration (FUSE) • Santa Barbara, CA, US
- 2017 Student poster presentation judge, Astrobiology Scientific Conferences (AbSciCon) • Mesa, AZ, US
- 2014 Astrobiology outreach activities with Ciudad Ciencia, Spain
- 2013 Astrobiology outreach activities with Ciudad Ciencia, Spain

## **OTHER PROFESSIONAL ACTIVITIES**

- 2024 Upcoming: Session Chair at Astrobiology Scientific Conferences, AbSciCon (Atlanta, GA, US)
- 2024 NSF Reviewer
- 2022 Session Chair at Astrobiology Scientific Conferences, AbSciCon (Atlanta, GA, US)
- 2022 Executive Secretary of the Biosignatures Rolling Evaluation Panel (REP) for NASA's Exobiology (EXO) Program, in the Planetary Science Division at NASA
- 2022 Reviewer of NASA Exobiology grant proposals
- 2022 Topic Editor for Life
- 2020 Guest Editor for Life
- Ad hoc reviewer for Nature, Physical Chemistry Chemical Physics (PCCP), PRX Life, Life, Pharmaceutical Analytica Acta

## **LANGUAGES**

- Native language: Spanish
- Fluent (speaking, reading, writing): English, French (CEFR Level C1 Certificate)
- Intermediate (speaking, reading, writing): Italian (CEFR Level B1 Certificate)
- Basic (speaking, reading, writing): Chinese (HSK Level 1 Certificate), Russian (CEFR Level A1 Certificate)

## **LIST OF PUBLICATIONS**

<https://scholar.google.com/citations?user=nzOjUiUAAA&hl>