César A. **Parra Rojas**

Post-doctoral fellow · Systems Medicine of Infectious Diseases

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Employment

Frankfurt Institute for Advanced Studies — *Frankfurt am Main, Germany*

Post-doctoral fellow — *May 2017 - Present*

Group of Systems Medicine of Infectious Diseases

Education

Udacity

Machine Learning Engineer Nanodegree — *2018*

view certificate

The University of Manchester — *Manchester, UK*

Doctor of Philosophy (Physics) — *2016*

- Thesis title: Intrinsic Fluctuations in Discrete and Continuous Time Models
- Supervisor: Prof. Alan J. McKane

Universidad de Chile — *Santiago, Chile*

M.Sc. Physics — *2013*

- Thesis title: Efectos Macroscópicos de las Fluctuaciones en un Baño Bacteriano Diluido (Macroscopic Effects of Fluctuations in a Dilute Bacterial Bath)
- Supervisor: Rodrigo Soto

Universidad de Chile — *Santiago, Chile*

B.Sc. Astronomy — *2012*

Universidad de Chile — *Santiago, Chile*

B.Sc. Physics — *2010*

Honours & Awards

2013 – 2016 **Becas-Chile Study Abroad Scholarship for PhD** — *CONICYT, Chile*

2012 **Fulbright nominee** — *Fulbright Comission, Chile*

2011 – 2012 **Masters Scholarship** — *CONICYT, Chile*

Publications

Journal articles:

1 Focused natural product elucidation by prioritizing high-throughput 2metabolomic studies with machine learning — *submitted*

N. J. Tobias, G. **C. Parra-Rojas**, *Y.-N. Shi, Y.-M. Shi, S. Simonyi, A. Thanwisai, A. Vitta, N. Chantratita, E. A. Hernandez-Vargas, and H. B. Bode*

|bioRxiv preprint|GitHub repository|

2 The trichotomy of pneumococcal infection outcomes in the host — *in press*

A. E. S. Almocera, G. Hernández-Mejía, **C. Parra-Rojas**, *and E. A. Hernandez-Vargas* — *Commun. Nonlinear Sci.*

|bioRxiv preprint|

3 Adjuvanted influenza vaccine dynamics — *2019*

C. Parra-Rojas, *V. von Messling, and E. A. Hernandez-Vargas* — *Scientific Reports* **9**, *73*

|PDF|GitHub repository|

4 Neuraminidase Inhibitors in Influenza Treatment and Prevention–Is It Time to Call It a Day? *2018*
C. Parra-Rojas, *V. K. Nguyen, G. Hernández-Mejía, and E. A. Hernandez-Vargas* *Viruses* **10(9)**, *454*
|PDF|GitHub repository|

5 The 2017 plague outbreak in Madagascar: data descriptions and epidemic modelling *2018*
V. K. Nguyen, **C. Parra-Rojas**, *and E. A. Hernandez-Vargas* *Epidemics* **25**, *20*
|PDF|bioRxiv preprint|GitHub repository|

6 Reduction of a metapopulation genetic model to an effective one island model *2018*
C. Parra-Rojas, *and A. J. McKane* *Europhys. Lett.* **122**, *18001*
|PDF|arXiv preprint|

7 Stochastic epidemic dynamics on extremely heterogeneous networks *2016*
C. Parra-Rojas, *T. House, and A. J. McKane* *Phys. Rev. E* **94(6)**, *062408*
|PDF|arXiv preprint|

8 Suppressing escape events in maps of the unit interval with demographic noise *2016*
C. Parra-Rojas, *J. D. Challenger, D. Fanelli, and A. J. McKane* *Phys. Rev. E* **94(5)**, *052133*
|PDF|arXiv preprint|

9 Intrinsic noise and two-dimensional maps: Quasicycles, quasiperiodicity, and chaos *2014*
C. Parra-Rojas, *J. D. Challenger, D. Fanelli, and A. J. McKane* *Phys. Rev. E* **90(3)**, *032135*
|PDF|arXiv preprint|

10 Casimir effect in swimmer suspensions *2014*
C. Parra-Rojas, *and R. Soto* *Phys. Rev. E* **90(1)**, *013024*
|PDF|arXiv preprint|

11 Active temperature and velocity correlations produced by a swimmer suspension *2013*
C. Parra-Rojas, *and R. Soto* *Phys. Rev. E* **87(5)**, *053022*
|PDF|arXiv preprint|

12 Pd^{2+}/Pd^{0} redox cycling in hexagonal $YMn_{0.5}Fe_{0.5}O_3$: Implications for catalysis by PGM substituted complex oxides *2011*
J. A. Kurzman, J. Li, T. D. Schladt, **C. R. Parra**, *X. Ouyang, R. Davis, J. T. Miller, S. L. Scott, and R. Seshadri* *Inorg. Chem.* **50**, *8073*
|PDF|

Conference proceedings:

1 From Microscopic Calcium Sparks to the ECG: Model Reduction Approaches for Multi-Scale Cardiac Simulation *2015*
M. A. Colman, **C. Parra-Rojas**, *and E. A. Pérez Alday* *Computing in Cardiology (CinC)*
|PDF|

Presentations

Talks

Kolloquium für Bioinformatik und Systembiologie Mittelhessen (KoBIS) *Dec 2018*
Chemical diversity in Xenorhabdus *and* Photorhabdus*: interpretable machine learning for natural product research* *Gießen, Germany*

28TH Annual Meeting of the Society for Virology *Mar 2018*
Role of adjuvants in immune response dynamics after influenza vaccination *Würzburg, Germany*

XIV Latin American Workshop on Nonlinear Phenomena *Sep 2015*
Mesoscopic description of discrete-time stochastic processes *Cartagena, Colombia*

XVIII Simposio Chileno de Física *Nov 2012*
Temperatura activa de una suspensión bacteriana (Active temperature of a bacterial suspension) *La Serena, Chile*

Posters

28TH Annual Meeting of the Society for Virology *Mar 2018*
Neuraminidase inhibitors—is it time to call it a day? *Würzburg, Germany*

Southern Workshop on Granular Materials *Dec 2012*
Velocity agitation energy due to an active suspension *Puerto Varas, Chile*

Technical Skills

Programming	Python, Mathematica. Familiar with MATLAB, FORTRAN, C++, Bash.
Data analysis and visualisation	NumPy, pandas, Matplotlib, Seaborn. Familiar with Plotly, Altair.
Machine Learning	scikit-learn, XGBoost, LightGBM, SHAP, PyTorch. Familiar with CatBoost, Keras.
Other	Git, LaTeX.

Projects

sdeparams

Python module for parameter estimation in stochastic differential equations with demographic noise.

github.com/cparrarojas/sde-parameter-estimation

find-wally

A deep learning solver for *Where's Wally?* puzzles, using transfer learning with the Keras implementation of RetinaNet.

github.com/cparrarojas/find-wally

Research Internships

Argonne National Laboratory & James Franck Institute — *Chicago, USA*

Chicago-Chile Materials Collaboration Program, University of Chicago — *Jan – Mar 2012*

- Supervisor: Prof. Igor Aronson
- Project: Study of noise effects on the nematic transition of bacterial suspensions

Cerro Calán Observatory — *Santiago, Chile*

Universidad de Chile — *Jan 2011*

- Supervisor: Dr. Francisco Förster
- Project: *Robotic telescope: optimisation of observation plan by means of Ant Colony Optimisation and genetic algorithms*

Materials Research Laboratory — *Santa Barbara, USA*

CISEI Program, University of California, Santa Barbara — *Jan – Mar 2010*

- Supervisors: Dr. Joshua Kurzman & Prof. Ram Seshadri
- Project: Pd^{2+}/Pd^{0} *redox cycling in hexagonal* $YMn_{0.5}Fe_{0.5}O_3$

Leadership

The University of Manchester Chilean Society — *Manchester, UK*

Chair — *2015–2016*

XI ChileGlobal Seminars UK: Education and Public Policy — *Manchester, UK*

Co-organiser — *May 2015*

The University of Manchester Chilean Society — *Manchester, UK*

Board member — *2014–2015*

Other activities

Music Guitarist, vocalist, songwriter. Tenor of the University of Manchester Chorus (2013–2014) and of the School of Science and Engineering Choir of Universidad de Chile (2007– 2009)