Résumé (download in PDF)

Cristián Huepe, PhD

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EDUCATION

University of Paris 7, École Normale Supérieure, Paris, France
Ph.D. in Physics **1999**
Dissertation: 'Bifurcations and instabilities in Bose-Einstein Condensates and Superfluid Flows'
Honors: *Summa cum laude* with congratulations from the jury

University of Paris 7, Observatoire de Paris, France
Diplôme d'Etudes Approfondies (DEA) in Astrophysics **1995**

Universidad de Chile, Santiago, Chile
Licenciatura (B.Sc.) in Physics **1993**
Honors: *Cum laude*

PROFESSIONAL EXPERIENCE

Northwestern Institute on Complexity (NICO), Northwestern University, Evanston IL, USA
Visiting Scholar **2011 – Present**

NSF Project: Experimental and theoretical analysis of collective dynamics in swarming systems
Research Scientist – NSF Grantee **2009 – Present**
Principal Investigator (with Prof. Iain Couzin, Princeton University) in theoretical and experimental study of collective motion. Supervised 3 PhD students and 5 postdocs. 2 published papers and 2 submitted to peer-reviewed scientific journals.

Max Planck Institute for the Physics of Complex Systems, Dresden, Germany
Advanced Study Group Member **Sep-Oct, 2011 / Jun-Jul, 2012 / May-Jun, 2013**
Participant in study group 'Statistical Physics of Collective Motion' & related workshops.
Supervised 1 PhD student and 1 postdoc. One submitted paper.

Max Planck Institute for the Physics of Complex Systems, Dresden, Germany
Guest Scientist **May-Jun, 2011**
Worked as visiting scientist on project 'Adaptive Networks, Opinion Formation, and Swarm Dynamics' with Prof. Thilo Gross. Supervised two PhD students and two postdocs. One paper published and one accepted for publication.

ESAM, Northwestern University, Evanston IL, USA
Visiting Scholar **2005 - 2011**
Collaborated with Prof. Mary Silber. Co-advised PhD student and 1 undergrad student.
Co-supervised the Interdisciplinary Nonlinear Dynamics IGERT 499 Study Group:
Swarming, Flocking, and Applications to Multi-Robot Systems.

NSF Project: Collective behavior of complex systems with long-range effective interactions: a network approach
Research Scientist – NSF Grantee **2005 – 2008**
Principal Investigator in theoretical analysis of complex network dynamics & swarming systems. Supervised three PhD students. Five published papers.

City University of Hong Kong, Kowloon, Hong Kong
Visiting Research Scientist **Jan-Feb, 2008**
Worked with Prof. Felipe Cucker at the Dept. of Mathematics on the project: 'Flocking with informed agents'. One published paper.

ESAM, Northwestern University, Evanston IL, USA
Postdoctoral Fellow **2002 - 2005**
Worked with Profs. Mary Silber and Hermann Riecke at Dpt. of Eng. Sci. & Appl. Math. on spatio-temporal chaos, Ginzburg-Landau equation, XY model, Faraday patterns and swarms. Five published papers.

James Franck Institute, University of Chicago, Chicago IL, USA
Postdoctoral Research Associate **2000 - 2002**
Worked with Prof. Leo Kadanoff on finite time singularities & network/swarm dynamics. Responsible for running the *Computations in Science* weekly seminar. Four published papers, one as sole author.

OTHER RECENT EXPERIENCE

- Jan 2013- Today: *Frontiers in Physics*, Computational Physics Review Editor
- Jun 2012: Local Organizer *Arts, Humanities, and Complex Networks — 3rd Leonardo satellite symposium at NetSci2012* (Northwestern University)
- Mar 2011: Workshop Organizer *Networks and Nonlinearities in the Musical Experience: From Perception to Appreciation* – at the ZiF Center for Interdisciplinary Research, Bielefeld University (Bielefeld, Germany)
- Jul 2009: Invited speaker on *The Physics of Music* at the Chicago Public Schools Teachers Workshop organized by The Science Institute (Columbia College Chicago).
- Mar 2009: Roundtable organizer and speaker at the *Ars Scientia: Conversations and Salons on Art and Science* series organized by the Chicago Cultural Center. Salon Title: *'Waves, Beats and Grooves: The Physics of Music'*.
- May 2007: Minisymposium organizer at the 2007 SIAM *Conference on Applications of Dynamical Systems*.
- Refereeing for Journals: Physical Review Letters; Physical Review A, B, and E; Physica A and D; Automatica; PLoS ONE; European Physical Journal; New Journal of Physics; SIAM Journal on Applied Dynamical Systems; Chaos; Nonlinearity; Journal of the Royal Society Interface; Journal of Statistical Physics; Bioinspiration & Biomimetics; Nature Scientific Reports.
- Peer-Reviewing for funding agencies: US National Science Foundation (NSF) panel member; French National Research Agency (ANR) project evaluation; Fondecyt (Chilean science and technology development fund) project evaluation; Netherlands Organization for Scientific Research (NWO) project evaluation.

AWARDS

- Awarded *National Science Foundation* Research Grant PHY-0848755 **2009 – 2012**
- Paper selected for 'Highlights of 2011' issue by the *New Journal of Physics* **2012**

- Awarded *National Science Foundation* Research Grant DMS-0507745 **2005 – 2008**
- Paper selected as *Frontier Research* by the *Virtual Journal of Nanoscale Science & Technology* **2004**
- MRSEC Postdoctoral Research Scholarship at University of Chicago **2000 – 2002**
- French Government PhD Scholarship for foreign students **1994 – 1999**

SELECTED PUBLICATIONS

Over 30 publications and 500 citations in peer-reviewed journals and proceedings.

- E. Ferrante, A. E. Turgut, M. Dorigo, and C. Huepe. *Elasticity-Based Mechanism for the Collective Motion of Self-Propelled Particles with Springlike Interactions: A Model System for Natural and Artificial Swarms*. Phys. Rev. Lett. 111, 268302 (2013)
- E. Ferrante, A. E. Turgut, M. Dorigo, and C. Huepe. *Collective Motion Dynamics of Active Solids and Active Crystals*. New J. Phys. 15 095011 (2013)
- K. Tunstrøm, Y. Katz, C. C. Ioannou, C. Huepe, M. J. Lutz, and I. D. Couzin. *Collective States, Multistability and Transitional Behavior in Schooling Fish.* PLoS Comput Biol **9**(2): e1002915 (2013)
- Eliseo Ferrante, Ali Emre Turgut, Cristián Huepe, Alessandro Stranieri, Carlo Pinciroli, Marco Dorigo. *Self-organized flocking with a mobile robot swarm: a novel motion control method.* Adaptive Behavior, **20**(6) 460-477 (2012)
- Huepe, R. F. Cadiz, M. Colasso. *Generating music from flocking dynamics.* American Control Conference (ACC), 4339-4344 (2012)
- S. Mishra, K. Tunstrøm, I. D. Couzin, and C. Huepe. *Collective dynamics of self-propelled particles with variable speed*. Phys. Rev. E **86**, 011901 (2012)
- J. G. Zschaler, G. A. Bohme, M. SeiBinger, C. Huepe, and T. Gross. *Early fragmentation in the adaptive voter model on directed networks.* Phys. Rev. E **85** 046107 (2012).
- Y. Katz, K. Tunstrøm, C. C. Ioannou, C. Huepe, and I. D. Couzin. *Inferring the structure and dynamics of interactions in schooling fish.* PNAS, doi: 10.1073, 1107583108 (2011)
- C. Huepe, G. Zschaler, A.-L. Do, and T. Gross. *Adaptive network models of swarm dynamics.* New Journal of Physics, **13**, 073022 (2011).
- C. Huepe and M. Aldana. *New tools for characterizing swarming systems: A comparison of minimal models.* Physica A **387** (12) 2809-2822 (2008).
- J. A. Pimentel, M. Aldana, C. Huepe, and H. Larralde. *Intrinsic and extrinsic noise effects on phase transitions of network models with applications to swarming systems.* Phys. Rev. E **77** 061138 (2008).
- A. E. Turgut, C. Huepe, H. Celikkanat, F. Gokce, and E. Sahin. *Modeling phase transitions in self-organized mobile robot flocks.* In "Ant Colony Optimization and Swarm Intelligence", Lecture Notes in Computer Science 5217, 108-119 (2008).
- M. Aldana, V. Dossetti, C. Huepe, V. M. Kenkre, and H. Larralde. *Phase Transitions in Systems of Self-Propelled Agents and Related Network Models.* Phys. Rev. Lett. **98** 095702 (2007).
- C. Huepe, Y. Ding, P. Umbanhowar and M. Silber. *Forcing function control of Faraday wave instabilities in viscous shallow fluids.* Phys. Rev. E **73** (1) 016310 (2006).
- C. Huepe, H. Riecke, K. Daniels and E. Bodenschatz. *Statistics of Defect Trajectories in Spatio-Temporal Chaos in Inclined Layer Convection and the Complex Ginzburg-Landau Equation.* Chaos **14** (3) 864-874 (2004).
- C. Huepe and M. Aldana. *Intermittency and clustering in a system of self-driven particle*s. Phys. Rev. Lett. **92** (16) Art. No. 168701 (2004).
- C. Huepe, L.S. Tuckerman, S. Metens and M.E. Brachet. *Stability and decay rates in nonisotropic attractive Bose-Einstein condensate*s. Phys. Rev. A **68** (2) Art. No. 023609 (2003).
- C. Huepe. *Dynamics of the convergence towards a self-similar blowup solution in a simplified model of aggregation.* Nonlinearity **15**(5), 1699-1715 (2002).

- C. Nore, C. Huepe, M. E. Brachet. *Subcritical Dissipation in Three-Dimensional Superflows*. Phys. Rev. Lett. **84**, 2191 (2000).
- Cristian Huepe, Marc-Etienne Brachet and Fabrice Debbasch. *Generic inflationary and noninflationary behavior in toy-cosmology*. Physica D **144** (2000) 20-36.
- C. Huepe, S. Metens, G. Dewel, P. Borckmans and M. E. Brachet. *Decay Rates in Attractive Bose-Einstein Condensates*. Phys. Rev. Lett. **82**, 1616 (1999).

SELECTED RECENT INVITED TALKS

- **Dec 2013:** Invited speaker at the *14th Workshop on Instabilities and Nonequilibrium Structures* (Viña del Mar, Chile)
- **Sep 2013:** Invited speaker at the *4th IFAC Workshop on Distributed Estimation and Control in Networked Systems* (Koblenz, Germany)
- **Apr 2013:** Invited speaker at the National Academy of Engineering's *2013 German-American Frontiers of Engineering Symposium* (Irvine CA, USA)
- **Jun 2012:** Invited speaker at the *Swarming, Collective Behavior, & Pattern Formation* session of the *Canadian Applied and Industrial Mathematics Annual Meeting, CAIMS 2012* (Toronto, Canada)
- **Sep 2011:** Invited speaker at the workshop *Collective Dynamics and Pattern Formation in Active Matter Systems* (MPIPKS, Dresden, Germany)
- **Jul 2011:** Invited speaker at the conference *Foundations of Computational Mathematics* (Budapest, Hungary)
- **Jun 2011:** Invited colloquium speaker at the Max Planck Institute for the Physics of Complex Systems (Dresden, Germany)
- **Jun 2011:** Invited speaker at the workshop Fluctuations and Response in Active Materials: From Driven Granular Systems to Swarming Bacteria (Lorentz Center, Leiden Netherlands)
- **Mar 2011:** Invited speaker at the workshop *Insect Self-organization and Swarming* (Mathematical Biosciences Institute, Ohio, USA)
- **Dec 2010:** Invited speaker at workshop *Disorder and Heterogeneity in Physics* (Santiago, Chile)
- **Jan 2010:** Invited speaker at the *XXXIX Winter Meeting on Statistical Physics* (Taxco, Mexico)

MEMBERSHIPS

- Member: American Physical Society (APS)
- Member: Society for Industrial and Applied Mathematics (SIAM)
- Honorary member of the ACHAYA (Chilean association for amateur astronomy)

LANGUAGES

- Spanish – native speaker
- English and French – fluently spoken, read and written
- German, Italian and Portuguese – basic understanding

PROFESSIONAL REFERENCES

- Prof. Iain Couzin (icouzin@princeton.edu) – *Collaborator*
  Department of Ecology and Evolutionary Biology, Princeton University. Princeton 08544, NJ, USA

- Prof. Thilo Gross (thilo2gross@gmail.com) – *Collaborator*
  Faculty of Engineering, University of Bristol; Woodland Road, Clifton BS8 1UB. Bristol, UK
- Prof. Leo Kadanoff (l-kadanoff@uchicago.edu) – *Postdoc advisor*
  James Franck Institute, University of Chicago. 5640 S. Ellis Ave., Chicago, IL 60637, USA
- Profs. H. Riecke (h-riecke@northwestern.edu) & M. Silber (m-silber@northwestern.edu) – *Postdoc advisors*
  ESAM, Northwestern University. 2145 Sheridan Road, Evanston, IL 60208, USA
- Prof. Felipe Cucker (macucker@math.cityu.edu.hk) – *Collaborator*
  City University of Hong Kong. 83 Tat Chee Ave., Kowloon Tong, Hong Kong
- Prof. Erique Tirapegui (etirapeg@pisco.dfi.uchile.cl) – *Undergraduate advisor*
  Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile. Casilla 487-3, Santiago, Chili
- Dr. Laurette Tuckerman (laurette@limsi.fr) – *Graduate student advisor*
  LIMSI-CNRS, BP 133. 91403 Orsay Cedex, France
- Dr. Marc-Etienne Brachet (brachet@lps.ens.fr) – *Thesis Advisor*
  Lab. de Physique Statistique, École Normale Supérieure. 24 rue Lhomond, 75231 Paris Cedex 05, France

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