Dr. Unai Alvarez-Rodriguez

Languages

• Spanish

• Basque

• English

Degrees

• Grade in Theoretical Physics, University of the Basque Country, July 2011.

• Master in Quantum Science and Technology, University of the Basque Country, September 2012.

• PhD thesis “Quantum Biomimetics”, University of the Basque Country, November 2016.

Current Position

• Postdoc at Basque Centre for Climate Change BC3.

• Visiting researcher at the School of Mathematical Sciences at Queen Mary University of London.

Previous Positions

• Postdoc at QUTIS group of Prof. Enrique Solano, Departamento de Química Física, Universidad del País Vasco UPV/EHU.

• PhD Student at QUTIS group of Prof. Enrique Solano, Departamento de Química Física, Universidad del País Vasco UPV/EHU.

Research Lines

• Complex Systems (2018-2019)

• Quantum Biomimetics (2013-2017)

• Quantum Simulations (2013-2017)

• Quantum Information (2013-2017)

Publications

• U. Alvarez-Rodriguez, J. Casanova, L. Lamata, E. Solano, “Quantum Simulation of Noncausal Kinematic Transformations”, Phys. Rev. Lett. 111, 090503 (2013).

• U. Alvarez-Rodriguez, M. Sanz, L. Lamata, E. Solano, “Biomimetic Cloning of Quantum Observables”, Sci. Rep. 4, 4910 (2014).

• U. Alvarez-Rodriguez, M. Sanz, L. Lamata, E. Solano, “The Forbidden Quantum Adder”, Sci. Rep. 5, 11983 (2015).

• X. -H. Cheng, U. Alvarez-Rodriguez, L. Lamata, X. Chen, E. Solano, “Time and Spatial Parity Operations with Trapped Ions”, Phys. Rev. A 92, 022344 (2015).

• T. Lee, U. Alvarez-Rodriguez, X. -H. Cheng, L. Lamata, E. Solano, “Tachyon Physics with Trapped Ions”, Phys. Rev. A 92, 032129 (2015).

• U. Alvarez-Rodriguez, M. Sanz, L. Lamata, E. Solano, “Artificial Life in Quantum Technologies”, Sci. Rep. 6, 20956 (2016).

• U. Las Heras, U. Alvarez-Rodriguez, E. Solano, and M. Sanz, “Genetic Algorithms for Digital Quantum Simulations”, Phys. Rev. Lett. 116, 230504 (2016).

• U. Alvarez-Rodriguez, R. Di Candia, J. Casanova, M. Sanz, and E. Solano, “Algorithmic Quantum Simulation of Memory Effects”, Phys. Rev. A 95, 020301(R) (2017).

• U. Alvarez-Rodriguez, A. Perez-Leija, I. L. Egusquiza, M. Gräfe, M. Sanz, L. Lamata, A. Szameit, and E. Solano, “Advanced-Retarded Differential Equations in Quantum Photonic Systems”, Sci. Rep. 7, 42933 (2017).

• R. Lui, U. Alvarez-Rodriguez, L. Lamata, and E. Solano, “Approximate Quantum Adders with Genetic Algorithms: An IBM Quantum Experience”, Quantum Meas. Quantum Metrol. 4, 1 (2017).

• U. Alvarez-Rodriguez, L. Lamata, P. Escandell-Montero, J. D. Martín-Guerrero, and E. Solano, “Supervised Quantum Learning without Measurements”, Scientific Reports 7, 13645 (2017).

• U. Alvarez-Rodriguez, M. Sanz, L. Lamata, and E. Solano, “Quantum Artificial Life in an IBM Quantum Computer”, Sci. Rep. 8, (1) 14793 (2018).

• L. Lamata, U. Alvarez-Rodriguez, J. D. Martín-Guerrero, M. Sanz, and E. Solano, “Quantum Autoencoders via Quantum Adders with Genetic Algorithms”, Quantum Science and Technology 4, (2019).

Research Visits and Seminars

• Research Visit to Group of Prof. Aspelmeyer, University of Vienna, Austria (June 2013).

• Invited talk in IV Jornadas de Investigación de la Facultad de Ciencia y Tecnología, Leioa, Spain (February 2014)

• Research Visit and Invited Seminar in Ion Trap Group at UC Berkeley, Berkeley, USA (July 2014).

• Research Visit and Invited Seminar in NASA’s Ames Research Center, USA (July 2014).

• Research Visit and Invited Seminar in Berkeley Quantum Information & Computation Center, Berkeley, USA (July 2014).

• Invited Seminar in Department of Electrical and Electronics, Leioa, Spain (March 2015).

• Research Visit in Walther Meissner Institute, Munich, Germany (July 2015).

• Research Visit and Invited Seminar in the Institute of Applied Physics, Jena, Germany (November 2015).

• Invited Seminar in Martes Cuanticos, University of Zaragoza, Spain (December 2015).

• Research Visit to Intelligent Data Analysis Laboratory, Valencia (February 2016).

• Invited Seminar in I Jornadas Doctorales de la UPV/EHU, Bilbao, Spain (July 2016).

• Research Visit and Invited Seminar in University of Massachusetts Boston, Boston (March 2017).

• Research Visit to NorthEastern University, Boston (March 2017).

• Research Visit to Harvard University, Boston (March 2017).

• Research Visit and Invited Seminar to Massachusetts Institute of Technology, Boston (March 2017).

• Research Visit to Universidtat Rovira i Virgili, Tarragona (April 2017).

• Research Visit to Institute for Biocomputation and Physics of Complex Systems, Zaragoza (April 2017).

• Research Visit to Queen Mary University, London (May 2017).

• Research Visit and Invited Seminar in Basque Centre for Climate Change, Leioa (June 2017).

International Schools and Congresses

**• International Workshop** “Quantum Simulations”, organized by E. Solano and Göran Wendin. Universidad del País Vasco UPV/EHU, Leioa, Spain (22-25 October 2012). Attendee.

**• International School** “Open Systems and the Quantum-Classical Boundary”, organized by Irene Burghardt, Sara Bonella, Giovanni Ciccotti, Angel S. Sanz Ortiz. University of Rome La Sapienza, Italy (8-12 April 2013). Attendee.

**• International Workshop** “Quantum Effects in Biological Systems”, organized by Alipasha Vaziri. Institute for Molecular Biotechnology, Vienna, Austria (29 June- 3 July 2013). Poster session.

**• International Workshop** “Quantum Simulations”, organized by I. Bloch, G. Johansson, F. Schmidt-Kaler, E. Solano and C. Wilson. Centro de Ciencias Pedro Pascual, Benasque, Spain (29 September- 4 October 2013). Poster session.

**• International Workshop** “ICE-1” organized by F. Luis, D. Zueco, M. D. Jenkins, Universidad de Zaragoza, Zaragoza, Spain (25-27 June 2014). Poster session.

**• International School and Workshop** “Strongly Correlated Fluids of Light and Matter”, ECT\*, Villazzano, Italy (12-23 January 2015). Poster presentation.

**• International Workshop** “ICE-2” organized by I. L. Egusquiza and L. Lamata, UPV/EHU, Bilbao, Spain (1-3 June 2015). Poster session.

**• International School** “Integrated quantum photonics applications: from simulation to sensing”, University of Rome La Sapienza, Rome, Italy (4-8 July 2016). Poster session.

**• International Workshop** “Crossroads in Complex Systems”, IFISC, Mallorca, Spain (5-8 June 2017). Contributed talk.

• **International Workshop** "*Assessment of the sustainability of complex social-ecological systems at different scales: methods, tools and approaches*", University of Kiel, Kiel, Germany (26-27 September 2018). Invited talk.

• **International School** "International Spring University on Ecosystem Services Modeling", BC3, Bilbao, Spain (20-24 May 2019). Short Talk.

**• International School "**Transformation, Adaptation and Mitigation for a 1.5 degree Global Warming", BC3, Bilbao, Spain (8-10 July 2019). Attendee.

Press

**• MIT Technology Review** http://www.technologyreview.com/view/532866/other-interesting-arxiv-papers-week-ending-november-29-2014/

**• MIT Technology Review** http://www.technologyreview.com/view/537676/quantum-life-spreads-entanglement-across-generations/

**• MATERIA** http://esmateria.com/2014/06/16/investigadores-espanoles-inventan-un-simulador-cuantico-que-permite-viajes-en-el-tiempo/

**• Zientzia Kalera** http://zientziakaiera.eus/2014/07/02/fisika-kuantikoaren-arauak-hausteko-agertoki-bat/

**• Phys.org** http://phys.org/news/2016-06-genetic-algorithms-quantum-simulations.html

**• Phys.org** https://phys.org/news/2017-02-artificial-intelligence-quantum.html

**• MIT Technology Review** https://www.technologyreview.com/s/609696/quantum-simulation-could-shed-light-on-the-origins-of-life/

Impact

• Most Highly Accessed article in the Physics section of Scientific Reports (2018)

• Top 25 Highly Accessed article in the Physics section of Scientific Reports (2017)