DR. JUAN DIEGO JARAMILLO SALAZAR

Curriculum Vitae

Work Address
Institut für Physik
Universität Augsburg
Universitätsstr. 1
D-86159 Augsburg

Email	juan.jaramillo@physik.uni-augsburg.de, judijasa@gmail.com
Links	ResearcherID, ResearchGate
Place of Birth	*Colombia*
Date of Birth	28 March 1983
Nationality	Colombian

"The good life is one inspired by love and guided by knowledge."

BERTRAND RUSSELL

POSITIONS

2017-2018   Universität Augsburg

Postdoc   Institut für Physik
Universitätsstr. 1
D-86159 Augsburg
Advisor: Prof. Dr. Peter Hänggi

2016-2017   National University of Singapore

Postdoc   Department of Physics
2 Science Drive 3
S-117551 Singapore
Advisor: Dr. Jiangbin Gong

2015   University of Massachusetts Boston

Postdoc   Department of Physics
100 Morrissey Blvd.
Boston MA 02125–3393 USA
Advisor: Dr. Adolfo del Campo

EDUCATION

	2010-2014 Leibniz Universität Hannover
PhD	Institute for Theoretical Physics

2010-2014   Leibniz Universität Hannover

PhD

Institute for Theoretical Physics
Appelstrasse 2, 30167 Hannover, Germany
Thesis: *One Dimensional 4-Component Alkali Fermions*
Description: Experiments in ultracold atoms suggest that an effective
4-components spinor gas is responsible for the spin dynamics of ^{40}K. In this
thesis we determine the corresponding phase diagram using a combination of
numerical and analytical tools. In particular, we make an extensive use of
bosonization to characterize the low energy excitations around the phase
transitions.
Advisor: Dr. Jun.-Prof. Temo Vekua

2008-2009   Abdus Salam Intl. Centre for Theo. Physics

Diploma

Condensed Matter Physics Section
Str. Costiera, 11, Trieste, Italy
Thesis: *Topological Order in Matter*
Description: Review on the physics of anyons, particles carrying
representations of the braiding group; including application to topological
qubits and their relation to quantum groups.
Advisor: Dr. Prof. Giuseppe Mussardo

2001-2007   Universidad del Valle - Colombia

Bachelor of Science

Department of Physics
Calle 13 # 100-00, Cali, Valle del Cauca, Colombia
Thesis: *Local and Global Quantum Computation: Evaluation of Interaction Cost in
Nano-structures*
Description: In this thesis we compare the polynomial efficiency between
different architectures for quantum computation based on cellular automata, as
a measure of time in the performance of a universal set of quantum logic gates.
Advisor: Dr. John H. Reina

PUBLICATIONS

Oct 2017   Quantum work fluctuations in connection
with the Jarzynski Equality

Physical Review E

Phys. Rev. E **96**, 042119. The Jarzynski equality (JE) is a well stablished
non-equilibrium method to estimate free energy differences. We report on the
existence of divergences in the variance of the Jarzynski equality as induced by
non-adiabaticity in the classical and quantum domain.
Authors: Juan D. JARAMILLO, Jiawen DENG and Jiangbin GONG

Jul 2017   Deformed Jarzynski Equality

Entropy

Entropy, **19**(8), 419. We present a deformed Jarzynski equality for both classical
and quantum non-equilibrium statistics, in efforts to reuse experimental data
that already suffers from severe statistical error. The technique proves useful
for classical systems and provides insight into the distinctive statistical error
from quantum effects.
Authors: Jiawen DENG, Juan D. JARAMILLO, Peter HÄNGGI and Jiangbin GONG

Jul 2016   Quantum supremacy of Many-Particle
Thermal Machines

*New Journal of
Physics*

New J. Phys. **18**, 075019. We show how the interplay of nonadiabatic and
many-particle quantum effects leads to quantum thermal machines that
outperform an ensemble of single-particle heat engines with same resources.
Authors: Juan D. JARAMILLO, Mathieu BEAU and Adolfo DEL CAMPO

Mar 2016	**Scaling-Up Quantum Heat Engines Efficiently via Shortcuts to Adiabaticity**
Entropy	Entropy, **18**(5), 168. We scale up a quantum heat engine utilizing a many-particle working medium and shortcuts to adiabaticity to boost power with minimal quantum friction. The particles interact via inverse-square pairwise potential and are confined by a time-dependent harmonic trap. We report performance for the Otto cycle. Authors: Mathieu Beau, Juan D. Jaramillo and Adolfo del Campo
Oct 2013	**Band-to-Mott Insulator Transformations in 4-component Alkali-metal Fermions at Half-filling**
Physical Review A	Phys. Rev. A **88**, 043616. We study the influence of an external magnetic field in a fermi gas with spin-changing collisions. Authors: Juan D. Jaramillo, Sebastian Greschner and Temo Vekua
Oct 2013	**Spin-orbit Coupled Fermions in Ladderlike Optical Lattices at Half-filling**
Physical Review B	Phys. Rev. B **88**, 165101. We study the ground-state phase diagram of two-component fermions loaded in a ladderlike lattice at half filling in the presence of spin-orbit coupling. Authors: Gao-Yong Sun, Juan D. Jaramillo, Luis Santos and Temo Vekua
Dec 2008	**Temporal Resources for Global Quantum Computing Architectures**
Brazilian Journal of Physics	Braz. J. Phys. **38**, Numb. 4. Using the methods for optimal simulation of quantum logic gates, we perform a quantitative estimation of the time resources involved in the execution of universal gate sets for the case of three representative models of quantum computation based on global control. Authors: Juan D. Jaramillo and John H. Reina

PRESENTATION AT INTERNATIONAL WORKSHOPS AND CONFERENCES

2016 · Talk at C3QS Conference: Coherent Control of Complex Quantum Systems, Okinawa Institute of Technology, Okinawa, Japan. Title: "Quantum supremacy of many-particle thermal machines"

2015 · Invited colloquium talk at University of Massachusetts Boston. Department of Physics. Title: "Strongly Correlated Spinor Gas"

2014 · Invited colloquium talk at Universidad Nacional de Colombia, Sede Manizales. Department of Physical Engineering. Location: Manizales, Caldas, Colombia. Talk: "Fermiones Acalinos en 1D: El diagrama de fases de ^{40}K"

2013 · RTG Workshop 2013. Research Training Group 1729: Fundamentals and applications of ultra-cold matter, Leibniz Universität Hannover. Location: Goslar, Lower Saxony, Germany. Talk: "Spin-3/2 Fermions with Cold Gases"

2012 · 6th Windsor Summer School: Low-Dimensional Materials, Strong Correlations and Quantum Technologies. Poster Contribution: "Quartetting to Pairing Transition in Spin-3/2 Fermions Under the Quadratic Zeeman Coupling"

2011 · École de Physique des Houches: Strongly Correlated Electronic Systems, Beyond Fermi Liquid Theory. Location: Chamonix, France. Poster Contribution: "Induced Transitions in Spin-3/2 Condensates"

2010 · Quo Vadis Bose-Einstein Condensation? International Workshop and Summer School. Max-Planck-Institut fur Physik komplexer Systeme.

2007 · Geometric and Topological Methods for Quantum Field Theory, Summer School, Villa de Leyva, Colombia.

2005 · 2nd National Meeting of Quantum Computing and Quantum Information, Popayán, Colombia.

COMPUTER SKILLS

Basic   HTML, C++

Intermediate   FORTRAN, BASH (Unix Shell)

Advanced   Python, Wolfram Mathematica, LaTeX

PROFESSIONAL EXPERIENCE

Referee   *Scientific Reports*, Nature Publishing Group
                   New Journal of Physics, IOP Publishing

Education   Teaching assistant at Leibniz Universität Hannover
                   Teaching assistant at Augsburg Universität

PROFESSIONAL INTERESTS

General   Quantum Technology, Quantum Dynamics, Condensed Matter Physics

Specific   Quantum Heat Engines, Fluctuation Theorems, Quantum Many-Body Physics

OTHER INFORMATION

Languages   SPANISH   ·   Mothertongue
                   ENGLISH   ·   Fluent
                   GERMAN   ·   Basic

ACADEMIC REFEREES

Postdoc Advisor Prof. Dr. Peter Hänggi
                   Professor of Physics
                   Institut für Physik
                   Universität Augsburg
                   Universitätsstr. 1
                   D-86159 Augsburg
                   Phone: +49 821 598 3249
                   Email: hanggi(at)physik.uni-Augsburg.de

Postdoc Advisor   Dr. Jiangbin Gong
Professor of Physics
Faculty of Science
National University of Singapore
Department of Physics S12
2 Science Drive 3
S-117551 Singapore
Phone: +65 6516 1154
Email: phygj(at)nus.edu.sg

Postdoc Advisor   Dr. Adolfo del Campo
Associate Professor of Physics
College of Science and Mathematics
University of Massachusetts Boston
100 Morrissey Blvd. Boston, MA 02125-3393
Office Location: S-3-105
Phone: 617 287 6050
Email: adolfo.delcampo(at)umb.edu

PhD Advisor   Dr. Jun.-Prof. Temo Vekua
Junior Professor
Condensed Matter
Leibniz Universität Hannover
Institut für Theoretische Physik
Appelstrasse 2, 30167 Hannover, Germany
Office Location: Raum 210
Phone: +49 (511) 762 17343
Email: Temo.Vekua(at)itp.uni-hannover.de

Diploma Advisor   Dr. Prof. Giuseppe Mussardo
Full Professor
Statistical Physics
Scuola Internazionale Superiore di Studi Avanzati (SISSA)
via Bonomea, 265 - 34136 Trieste, Italy
Phone: +39 040 3787 411
Email: mussardo(at)sissa.it

BSc Advisor   Dr. John H. Reina
Associate Professor
Quantum Technology Information and Complexity
Universidad del Valle, Colombia
Departamento de Física
Edif. 320 - Sede Melendez
Calle 13 No 100-00 Cali, Colombia
Phone: +57 (2) 3394610
Email: john.reina(at)correounivalle.edu.co

January 3, 2018