JUAN GARCÍA NILA

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EDUCATION

University of Southern California (USC) *January 2020 - Present*
Doctoral Student (Electrical Engineering) *USC Viterbi School of Engineering.* GPA: 3.85
Quantum Information Processing
Advisor: Todd A. Brun

University of Southern California (USC) *March 2020 - March 2023*
Master in Quantum Information Processing *USC Viterbi School of Engineering.* GPA: 3.85

Universidad Nacional Autónoma de México (UNAM) *February 2016 - January 2019*
Master of Science (Physics) *Posgrado en Ciencias Físicas.* GPA: 9.83/10
Dissertation title: "Bose–Einstein condensation in crystals with vacancies"
Committee: M. A. Solís Atala (Thesis adviser), J. A. Seman Harutinian, F. Álvarez Ramírez, E. Castellanos Alcántara and R. Méndez Fragoso (Chair)

Universidad Nacional Autónoma de México (UNAM) *August 2011 - November 2015*
Bachelor of Science (Physics) *Facultad de Ciencias.* GPA: 9.97/10
Top Student. The student with the highest cumulative GPA in Class of 2012.

RESEARCH EXPERIENCE

Research in Quantum Information Science *March 2015- Present (August 2022)*
USC Viterbi School of Engineering *Adviser. Todd A. Brun*
-Markovian and non-Markovian master equations, Nakajima Zwanzig non-markovian equation, Time convolutionless lindblad equation and Rotating wave approzimation markovian master equation.
- Continous quantum Error Correction for different Non Markovian Models.
- Post Markovian Master Equation on Bacon Shor Code and Three Qubit Repetition Code
- QAOA Optimization for graphene layer using Quiskit and DWave method.
- Interested in Quantum Information Processing, error correction, decoherence free subsystems, open quantum systems and algorithms.

Theoretical research in Many-Body Quantum Theory *March 2015- November 2019*
Instituto de Física UNAM, Mexico City, Mexico *Adviser. Miguel Ángel Solís Atala*
- Studied analytically the effects on the thermodynamic behavior of an ideal boson gas immersed in an imperfect crystal modeled by a Dirac Kronig-Penney potential. Proof that the vacancy generates a gap between the impure ground state and the first excited state generates a Bose Einstein Condensation (BEC) even at one dimensional system.

Experimental research in the Applied Optics Lab *August 2016 - March 2017*
Instituto de Ciencias Nucleares UNAM, Mexico City, Mexico *Adviser. Pedro Antonio Quinto Su*

Mitacs Globalink Reasearch Intern *May 2016 - June 2016*
Simon Fraser University, Burnaby, Canada *Adviser. Jeffrey McGuirk*
- Implemented an electronic feedforward system to operate a vortex tube to prevent the overheating of the equipment. Studied the spin transport in a trapped ultra-cold spin-polarized ^{87}Rb gas at temperatures above quantum degeneracy.

TEACHING EXPERIENCE

Teaching Assistant *Jan 2023- Present*
University of Southern California
-Courses in the Master of Quantum Information Science:

Linear Algebra for Engineering EE510. Vector spaces, subspaces, matrix subspaces and rank nullity theorem. Applications to Machine Learning, Whitening, and Digital compression.

Quantum Information Science. Quantum Shannon theory: quantum channels and entanglement; dense coding, teleportation, compression, and quantum capacity theorems.

Teaching Assistant *May 2017- 2018*

Facultad de Ciencias UNAM, Mexico City, Mexico Vectorial Mechanics (Spring 2016), Contemporary Physics (Fall 2017 and Fall 2018), Analytical Mechanics (Spring 2018). T.A. of Dr. Juan Carlos Degollado Daza.
Basic Electromagnetism(Spring 2021) and Advanced Electromagnetism (Fall 2020) T.A. of MSc. Erik Jiménez Vazquez. Differential and Integral Calculus II (Spring 2019). T.A. of MSc. Kenya Verónica Espinosa Hurtado.
-Tutored, held office hours, graded homeworks and exams, and contributed to syllabus design.

Adjunct Associate Professor *May 2019- Present*

Facultad de Ciencias UNAM, Mexico City, Mexico
-Adjunct Professor Contemporary Physics (Fall 2019) and Basic Science (Fall 2020).
- Classes taught over 100 freshman undergrad students from Physics, Applied Mathematics and Engineering Majors.
- Coordinated seminars given by graduate students and industrial researchers to freshman undergrad students.

PUBLICATIONS

Z. Xia, J. García-Nila and D. Lidar. "Markovian and non-Markovian master equations versus an exactly solvable model of a qubit in a cavity" (2023). Manuscript in preparation)

J. García-Nila and T. Brun. "Weak Measurement continuous Error Correction using different non markovian models" (2023). Manuscript in preparation)

J. G. Martínez-Herrera, J. García-Nila and M. A. Solís. (2019) "Bose Gas with generalized dispersion relation plus an energy gap", Physica Scrypta, Volume 94, Number 7. DOI: 10.1088/1402-4896/ab0a78

J. García-Nila, J. G. Martínez-Herrera and M. A. Solís. "Raising the Bose-Einstein critical temperature with vacancies". (Manuscript in preparation)

PRESENTATIONS

SQuInT 2023 25th Annual SQuInT scientific program. *University of New Mexico. October 26, 2023*

STAQ 2023 *Durham NC, USA. June 19 2023*
-Error Correction and Ion-based quantum computer Workshop. Duke Quantum Center Duke University.

APS March Meeting 2023 *Las Vegas NV, USA. March 9 2023*
-Oral Presentation. "Continuous quantum error correction on non-Markovian models".

IPAM UCLA *Los Angeles CA, USA. 23 Feb 2023*
-Winter School on Contemporary Quantum Algorithms and Applications (QAA2023)

ECE 12th Annual Research Festival *Los Angeles CA, USA. October 2022*
-Poster presentation. "Continuous quantum error correction on non-Markovian models".

APS March Meeting 2019 *Boston MA, USA. March 2019*
-Poster presentation. "Boosting the BEC critical temperature of an ideal Bose gas within a crystal with vacancies".

APS March Meeting 2018 *Los Angeles CA, USA. March 2018*
Poster presentation. "Boundary condition effects on the energy spectrum of an one dimensional imperfect crystal".

Escuela de Superconductividad *BUAP, Puebla, México November 2017.*

HONORS AND AWARDS

EducationUSA Opportunity Funds Scholarship Grantee *May 2019- Present*
- Grant from the U.S. Department of State to outstanding students who present financial hardship to cover expenses of the admission process to a university in the United States. 17 grantees were selected out of 293 applicants.

Gabino Barreda Medal *May 2018*
-To the most outstanding undergraduate Physics student of the Class 2012 at UNAM.

Consejo Nacional de Ciencia y Tecnología (CONACyt) Scholarship *February 2016- November 2018*
- Grant from CONACyT which covers a monthly stipend to mexican students who are enrolled in a graduate program recognized in the Programa Nacional de Posgrados de Calidad (PNPC).

MEMBERSHIPS

American Physical Society *May 2019- Present*

Mexican Physical Society *February 2016- November 2018*

LANGUAGES

Spanish: Native Speaker
English: TOEFL iBT 105. Reading: 29, Listening: 25, Speaking: 25 and Writing: 26.
Japanese: Basic N4.

TECHNICAL SKILLS

Programming: Python, Julia & LaTeX
Software Packages: Mathematica, Octave, MATLAB & Microsoft Office
GRE: Quantitative: 161, Verbal: 152