

# Jose Nahuel Freitas

PHD IN PHYSICS. RESEARCHER.

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## Education

### University of Buenos Aires

PHD IN PHYSICAL SCIENCES

- Thesis title: Thermodynamics and quantum simulations in ion traps
- Funded with a national level fellowship given by the Argentinian goverment.

Buenos Aires, Argentina.

Apr. 2012 - Apr. 2017

### University of Buenos Aires

LICENCIATE IN PHYSICAL SCIENCES

- Grade point average (GPA): 9.47 over 10

Buenos Aires, Argentina

Apr. 2006- Jun. 2011

### National Institute for Civil Aviation (INAC)

AVIONICS TECHNICIAN. HIGH SCHOOL.

Buenos Aires, Argentina.

Apr. 1997- Jun. 2002

## Experience

### University of Luxembourg (group of Prof. Massimiliano Esposito).

POSTDOCTORAL RESEARCHER

- Study of the energetics of information processing with electronic circuits from the point of view of modern stochastic thermodynamics.
- Design of experiments to test and study refrigeration cycles in electrical systems.
- Development of a long-term research plan and preparation of funding applications.

Luxembourg

Oct. 2018 - PRESENT

### University of Mainz (group of Prof. Ferdinand Schmidt-Kaler)

SHORT-TERM INVITED RESEARCHER

- Mathematical modeling of a high-precision experiment with trapped ions to study the thermodynamical limits to the measurement of time.
- Design of an efficient algorithm for the analysis of very long time series and clock stability.
- Assisted in the supervision of a master student.

Mainz, Germany

Jun. 2018 - Oct. 2018

### Saarland University (group of Prof. Giovanna Morigi)

POSTDOCTORAL RESEARCHER

- Application of machine learning techniques for the computational description and manipulation of many-body quantum states.

Saarbrücken, Germany

Jun. 2017 - Apr. 2018

### University of Buenos Aires (QUFIBA group)

DOCTORAL RESEARCHER

- Identification of fundamental limits for cooling in a family of driven quantum refrigerators.
- Study of heat transport in harmonic lattices, in particular crystals of trapped ions.
- Quantum simulation of magnetic materials in ion traps. Quantum correlations and decoherence.
- Design of a genetic algorithm for the optimization of ion crystal structure.

Buenos Aires, Argentina

Apr. 2012 - Apr. 2017

### University of Buenos Aires, Physics department

ASSISTANT TEACHER

- Teaching of several theoretical and experimental subjects such as Classical, Quantum and Statistical Mechanics, Electromagnetism, Fluid Mechanics, and Experimental Techniques.

Buenos Aires, Argentina

Jun. 2009 - Jun. 2017

### Institute of Scientific and Technical Research for Defense (CITEDEF)

UNDERGRADUATE STUDENT

- Development of a coincide detector with nanosecond resolution.
- Quantum optical experiments with correlated photons.

Buenos Aires, Argentina

Apr. 2010 - Dec. 2010

### Movilogic S.A.

SOFTWARE DEVELOPER

- Mobile/Web developer of sales applications (for early handheld devices like the Palm Treo).
- Database management.

Buenos Aires, Argentina

Mar. 2004 - Mar. 2006

### Audiotel S.A.

SOFTWARE DEVELOPER

- Programming of IVR (Interactive Voice Response) applications.
- Management of PBX telephone systems.

Buenos Aires, Argentina

Mar. 2003 - Mar. 2004

## Skills

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<b>Programming/Tools</b>	Python, C/C++, Matlab, Julia, SQL, Pandas, Git, Jupyter, LaTeX.
<b>Scientific Computing</b>	NumPy/SciPy, Numba, Matplotlib, MPI.
<b>Communication</b>	Ample experience in teaching, presentation of results in international conferences, and science outreach.
<b>Languages</b>	Spanish, English

## Publications

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- 2019 **Cooling to Absolute Zero: The Unattainability Principle**  
JN Freitas, R Gallego, L Masanes, JP Paz. *Thermodynamics in the Quantum Regime. Fundamental Theories of Physics*, vol 195. Springer, Cham
- 2018 **Neural Quantum Operations and Susuki-Trotter evolution of Neural Quantum States**  
JN Freitas, G Morigi, V Dunjko. *IJQI Vol. 16, No. 08, 1840008 (2018)*
- 2018 **How much can we cool a quantum oscillator? A useful analogy to understand laser cooling as a thermodynamical process**  
JN Freitas, JP Paz. *Phys. Rev. A* 97, 032104
- 2017 **Fundamental limits for cooling of linear quantum refrigerators**  
JN Freitas, JP Paz. *Phys. Rev. E* 95, 012146
- 2016 **Automation of the Bechdel-Wallace test**  
JN Freitas, M Rosenzvit, S Muller. *Journal of Ethics and Films*
- 2015 **Heat transport through ion crystals**  
JN Freitas, E Martinez, JP Paz. *Physica Scripta, Volume 91, Number 1*
- 2014 **Analytic solution for heat flow through a general harmonic network**  
JN Freitas, JP Paz. *Phys. Rev. E* 90, 042128
- 2012 **Dynamics of Gaussian discord between two oscillators interacting with a common environment**  
JN Freitas, JP Paz. *Phys. Rev. A* 85, 032118

## Post-Graduate Courses

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- 2015 **Introduction Quantum Optics**, FCEyN, University of Buenos Aires
- 2014 **Introduction to Cellular and Molecular Biology**, FCEyN, University of Buenos Aires
- 2013 **Advanced topics on Thermodynamics and Statistical Mechanics**, FCEyN, University of Buenos Aires
- 2012 **Computational Neuroscience**, FCEyN, University of Buenos Aires
- 2012 **Neural Networks**, FCEyN, University of Buenos Aires