

# Jesús David Cifuentes Pardo

## Curriculum Vitae

Rua Alvarenga 2392  
São Paulo, Brazil  
+55 (11)963241631  
jesuscif@if.usp.br

I am currently a Master's student at the Institute of Physics in the University of São Paulo (IFUSP). I work at the department of Theoretical Condensed Matter Physics with my advisor Luis Gregório Dias. Before that, I obtained a double-degree in Physics and Mathematics at Universidad de los Andes, Colombia (2016).

My research interests include:

- Quantum Computation.
- Topological Materials.
- "Majorana Physics": Search, braiding, topological quantum computation.
- Silicon-based quantum computing.
- Electronic transport in low-dimensional systems.

## Education

- March 2017 – **M.Sc. in Physics**, *Institute of Physics, Universidade de São Paulo (IFUSP)*, São Paulo, SP, Brasil.
- Jan 2013 – **B.Sc. in Mathematics**, *Universidad de los Andes*, Bogotá, Colombia.
- April 2017 GPA: 4.45/5.00 . Class rank #2 out of 20. Statistics from :  
[https://planeacion.uniandes.edu.co/dmdocuments/Boletin\\_estadistico\\_2016.pdf](https://planeacion.uniandes.edu.co/dmdocuments/Boletin_estadistico_2016.pdf)
- Jan 2012 – **B.Sc. in Physics**, *Universidad de los Andes*, Bogotá, Colombia.
- Oct 2016 GPA: 4.45/ 5.00. Class rank #2 out of 20
- Dec 2011 **High School Diploma**, *Colegio Corazonista*, Bogotá, Colombia.  
Graduated with honors.

## Research

- March 2017 – **Master's Research Project: "Kondo-Majorana Coupling in Double Quantum Dots "**, *Advisor: Luis Gregório Dias*.  
March 2019 Performed a theoretical and numerical transport study of a Double Quantum Dot system coupled to a Majorana chain. Both interacting and non-interacting regimes are considered. Majorana manipulation is achieved by tuning the QD gate voltages and tunnel couplings. The study has potential applications on topological quantum computing architectures.  
Draft for Publication: <https://git.io/fp2zX> Poster: <https://git.io/fp2vS>
- Aug 2016 – **Undergraduate thesis in Mathematics: "On Gauging Symmetries of 2D Topological Quantum Field Theories"**, *Advisor: César Galindo*.  
Dec 2016 The algebraic structure used to describe the time evolution of a 1D quantum system is a 2D topological quantum field theory (2TQFT). This structure has acquired some interest because of its relation with topological quantum computation. My thesis presented an algebraic classification of the symmetries of 2TQFTs.  
Link: <https://repositorio.uniandes.edu.co/handle/1992/15220> Grade: 5.00/5.00.
- Sept 2015 – **Undergraduate thesis in Physics: "Understanding Topological order in 1D fermion chains"**, *Advisor: Andrés Reyes Lega*.  
May 2016 Studied the topological features of the Kitaev chain. The analysis allowed us to understand the concept of Topological order as well as the appearance of majorana modes, which are of great interest for quantum computation.  
Link: <https://repositorio.uniandes.edu.co/handle/1992/17840> Grade: 4.80/5.00.

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## Awards

- March 2017 – **Scholarship(CNPq)** for Master studies in Physics at the University of São Paulo.  
March 2019  
May 2012 First place at **National Undergraduate Math Olympiad**, Colombia.  
July 2011 Participant of the **52<sup>th</sup> International Mathematical Olympiad (IMO)**, Netherlands.

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## Events

- Aug 2018 Workshop on Strong Electron Correlations in Quantum Materials: Inhomogeneities, Frustration, and Topology, *ICTP-SAIFR*, São Paulo, Brasil.  
**Poster presentation:** Manipulation of Majorana Modes in Double Quantum Dots.
- May 2018 Autumn Meeting, *Brazilian Physical Society*, Foz de Iguaçu, Brazil.  
**Poster presentation:** Manipulation of Majorana Modes in Double Quantum Dots.
- July 2017 1st Workshop on Topological Quantum Phenomena and Quantum Information Science, *International Institute of Physics*, Sao Carlos, Brasil.  
**Poster presentation:** Edge-States and Topological Phase Transitions in the Kitaev Chain.
- March 2017 Topological States of Matter, *International Institute of Physics*, Natal, Brasil.  
**Poster presentation:** Edge-States and Topological Phase Transitions in the Kitaev Chain.
- July 2016 Journeys on Theoretical Physics, *ICTP-Perimeter-SAIFR*, Sao Paulo, Brasil..
- June 2016 Non-Commutative Geometry, *Universidad Javeriana*, Villa de Leyva, Colombia..
- May 2016 Random Geometries, *8th School on Mathematical Physics*, Universidad de los Andes, Bogotá , Colombia..
- July 2015 Geometrical, Algebraical and Topological Methods for Quantum Field Theory, *Universidad de los Andes*, Villa de Leyva, Colombia..
- June 2015 Workshop on Mathematical Structure and Foundations of Quantum Physics, Universidad de los Andes, Bogotá , Colombia.  
**Talk presentation:** "The GNS construction: An algebraic Formalism for Quantum Physics".
- May 2015 Topological Quantum Matter: From Theory to Application, *7th School on Mathematical Physics*, Universidad de los Andes, Bogotá , Colombia..
- Jan 2015 - May 2015 Quantum Computing Seminar, Universidad de los Andes, Bogotá , Colombia..

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## Teaching Experience

- 2014, 2016 **Teaching Assistant of Linear Algebra I**, *Department of Mathematics*, Universidad de los Andes, Bogotá.  
Semi-annual part-time job.
- 2013, 2015 **Teaching Practice in Physics**, *Department of Physics*, Universidad de los Andes, Bogotá..  
Semi-annual part-time job.
- June 2012, 2013, 2014 **Instructor at Summer Intership in High School Mathematical Olympiads**, *Olimpiadas Colombianas de Matemáticas*, Universidad Antonio Nariño, Bogotá..  
Summer full-time job.

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## Volunteer Work

Aug 2015 – **Organizer of the Physics Seminar for Students**, Universidad de los Andes,  
 Nov 2016 Bogotá..  
 Annual part-time.

Aug 2016 – **Peace lectures on Public Space**, Universidad de los Andes, Bogotá.  
 Sept 2016 Part-time.

July 2013 **Leading Guide at the 54th International Mathematical Olympiad** , *Olimpiadas Colombianas de Matemáticas*, Santa Martha, Colombia.  
 July 18 - July 28 . Full-time.

## Languages

Spanish Mother tongue  
 English Fluent. Toefl iBT: 101. Reading: 28 , Listening: 30, Speaking: 22 , Writing: 21  
 Portuguese Fluent

## Computational Skills

### Programming Languages

Advanced: C++ , Python, Latex  
 Intermediate: Java, R , Matlab

### Operating Systems

Advanced: Ubuntu, Windows

### Computational Experience

March 2017- **NRG simulations of double quantum dots coupled to Majorana wires**, *Institute of Physics (USP)*, São Paulo, Brasil.  
 December 2018 Github: <https://github.com/cifu9502/nrgcode>

### Courses

April 2018 **Mini-Course: Tensor Networks and Applications**, *Institute of Physics USP*, São Paulo, Brasil.  
 September 2017 **Minicourse on Machine Learning for Many-Body Physics**, *ICTP-SAIFR*, São Paulo, Brasil.

## Academic References

### Masters Advisor

Luis Gregório Dias  
 Universidade de São Paulo (USP)  
 Institute of Physics  
[luisdias@if.usp.br](mailto:luisdias@if.usp.br)  
<http://www.fmt.if.usp.br/~luisdias/>

### Advisor in Mathematics

César Galindo  
 Universidad de Los Andes  
 Department of Mathematics  
 E-mail: [cn.galindo1116@uniandes.edu.co](mailto:cn.galindo1116@uniandes.edu.co)  
<https://sites.google.com/site/neyitgalindo/>

### Advisor in Physics

Andrés Fernando Reyes Lega  
 Universidad de Los Andes  
 Department of Physics  
 E-mail: [anreyes@uniandes.edu.co](mailto:anreyes@uniandes.edu.co)  
<http://fisica.uniandes.edu.co/profesores/anreyes/students/>