

CURRICULUM VITAE

# Hanne Van Den Bosch



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Santiago Centro

CHILE

**date of birth**

April 13, 1990

## Current job

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2017-present

**Postdoctoral researcher**

*Center for Mathematical Modeling, Universidad de Chile, Santiago*

## Education

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2013 - 2017

**Doctorado en Física**

*Pontificia Universidad Católica, Santiago*

- Specialization : Mathematical Physics
- Supervisor: Rafael Benguria
- Thesis: Spectrum of Graphene Quantum Dots.
- Research visits at IST Austria (2014), Stuttgart University (2015) and Aarhus University (2016).
- Graduated with highest honours in August 2017

2011 - 2013

**Master of science in Physics, research focus**

*Université catholique de Louvain, Louvain-la-Neuve*

- Specialization : Statistical and Mathematical Physics
- Option : Particle Physics and Cosmology
- Erasmus exchange at *Università di Bologna*, Italy in February-July 2012
- Final dissertation on Probabilistic Cellular Automata (supervisor: Jean Bricmont)
- Graduated with highest honours in June 2013

2008 - 2011

**Bachelor in Mathematics**

*Université catholique de Louvain, Louvain-la-Neuve*

- Minor in Physics
- Final dissertation on chaotic dynamical systems
- Graduated with high honours in June 2011

## Publications

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- Jean Bricmont, Hanne Van Den Bosch, *Intermediate model between majority voter PCA and its mean field model*, Journal of statistical Physics **58** (2015).
- Rafael D. Benguria, Hanne Van Den Bosch, *A criterion for the existence of zero modes for the Pauli operator with fastly decaying magnetic fields*, Journal of Mathematical Physics **56** (2015).
- Phan Thành Nam, Hanne Van Den Bosch, *Nonexistence in Thomas-Fermi-Dirac-von Weizsäcker theory with small nuclear charges*, Mathematical Physics Analysis and Geometry **20**, 6 (2017).
- Rafael D. Benguria, Søren Fournais, Edgardo Stockmeyer, Hanne Van Den Bosch, *Spectral gaps of Dirac operators describing graphene quantum dots*, Mathematical Physics Analysis and Geometry **20**, 11 (2017).
- Rafael D. Benguria, Søren Fournais, Edgardo Stockmeyer, Hanne Van Den Bosch, *Self-adjointness of two-dimensional Dirac operators on domains*, Annales Henri Poincaré **18** 1371 (2017).
- Rupert Frank, Phan Thành Nam, Hanne Van Den Bosch, *The ionization conjecture in Thomas-Fermi-Dirac-von Weizsäcker theory*, Comm. Pure Appl. Math **LXXI**, 0577–0614 (2018).
- Rupert Frank, Phan Thành Nam, Hanne Van Den Bosch, *The maximal excess charge in Müller density-matrix-functional theory*, Preprint ArXiv 1608.05625 (2016), to appear in Annales Henri Poincaré.
- Rupert Frank, Phan Thành Nam, Hanne Van Den Bosch, *A short proof of the ionization conjecture in Müller theory*, to appear in Proceedings QMath13 (2016).
- Rafael D. Benguria, Cristobal Vallejos, Hanne Van Den Bosch, *Gagliardo-Nirenberg-Sobolev inequalities for convex domains in  $\mathbb{R}^d$* , to appear in Mathematical Research Letters.

## Grants and awards

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March 2018	<b>FONDECYT Postdoctoral Project</b> granted by CONICYT, Chile. Funding for a three-years research project entitled <i>Partial Differential Equation Methods for the Physics of Elementary Particles</i> .
December 2017	<b>Premio de Excelencia en Tesis Doctoral 2017</b> awarded by the <i>Pontificia Universidad Católica de Chile</i> to the best PhD-thesis in the areas of Chemistry, Physics and Matematics.
December 2017	<b>Principal Investigator of project “ International Networks for Researchers in Initial Stage ”</b> granted by CONICYT, Chile. A 18-months project entitled <i>Towards a Many-Body description of Graphene and Related Honeycomb structure</i> , aimed at international collaboration with researchers from the Faculty of Mathematics at LMU Munich (Germany) and the Institut Élie Cartan of the Université de Lorraine (France).
March 2014	<b>PhD Scholarship</b> granted by CONICYT, Chile. Scholarship to fund PhD studies.

## Experience

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**Research** Ever since the work on my Master thesis I have been conducting research in an independent manner, in a wide array of topics within Mathematical Physics and interacting with colleagues from different institutions and specializations. This provided me with a toolbox of techniques pertaining to several fields within mathematics and the skills to combine them efficiently when tackling a specific mathematical question.

**Teaching** During my PhD I have been teaching assistant for the course *Métodos matemáticos de la Física II* for three semesters, which taught me to prepare exercises and present them pedagogically to students from different backgrounds (Physics, Mathematics and Engineering). I also gave a heuristic introduction to function spaces to undergrad and grad students in physics as part of the mini-course *Rigorous results in the Ginzburg-Landau model of superconductivity*, PUC, Santiago, 22 de octubre 2015.

**Organizing** Applying for an International Networks-project coordinating the paperwork from different researchers and obtaining the support of their institutions. Participation in the organisation of ICMP (*International Congress on Mathematical Physics*) in Santiago, coordinating the group of volunteering students, organizing the schedules, book of abstract and solving practical issues.

**Outreach** Participation in the *Centro científico estudiantil* of the municipality of La Pintana in Santiago: organizing physics workshops for school kids and ordering the available didactic material.

## Language skills

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**Dutch** Mother tongue

**Spanish** Almost as a native speaker

**English, French** Excellent speaking and writing skills

**German, Italian** Basic knowledge

## Participation in Conferences

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- **EEQUADD MathAmSud Workshop**, Santiago, December 7, 2017. Talk: Non-existence of minimizers for the TFDW functional and related problems.
- **Encuentro SOMACHI**, Talca, November 3, 2017. Talk in PDEs session: Non-existence of minimizers for the TFDW functional and related problems.
- **Mathematical Congress of the Americas**, Montreal, July 26, 2017. Talk in Mathematical Physics session: Spectral gaps of Dirac operators describing graphene quantum dots.
- Phase transitions in PCA and associated mean field models, seminario de Teoría Espectral PUC, November 21, 2013, Santiago.

- Phase transitions in probabilistic cellular automata, seminario Universidad Adolfo Ibáñez, May 13, 2014, Santiago.
- Phase transitions in probabilistic cellular automata : an intermediate model, International conference on Spectral Theory and Mathematical Physics, November 24–29, 2014, Santiago.
- A criterion for the existence of zero modes for the Pauli operator with fastly decaying fields, seminario de Teoría Espectral PUC, March 19, 2015, Santiago.
- Phase transitions in probabilistic cellular automata : an intermediate model, Young Researchers Symposium, June 25, 2015, Santiago.
- Introducción matemática para minicurso *Rigorous results in the Ginzburg-Landau model of superconductivity*, PUC, Santiago, October 22, 2015.
- A criterion for the existence of zero modes for the Pauli operator with fastly decaying fields, seminario universität Stuttgart, November 25, 2015, Stuttgart.
- Spectral gaps of Dirac operators describing graphene quantum dots, 50 years of hearing drums, Santiago, May 16–20, 2016.

## Other talks

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- Phase transitions in PCA and associated mean field models, seminario de Teoría Espectral PUC, November 21, 2013, Santiago.
- Phase transitions in probabilistic cellular automata, seminario Universidad Adolfo Ibáñez, May 13, 2014, Santiago.
- Phase transitions in probabilistic cellular automata : an intermediate model, International conference on Spectral Theory and Mathematical Physics, November 24–29, 2014, Santiago.
- A criterion for the existence of zero modes for the Pauli operator with fastly decaying fields, seminario de Teoría Espectral PUC, March 19, 2015, Santiago.
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- A criterion for the existence of zero modes for the Pauli operator with fastly decaying fields, seminario universität Stuttgart, November 25, 2015, Stuttgart.
- Spectral gaps of Dirac operators describing graphene quantum dots, 50 years of hearing drums, Santiago, May 16–20, 2016.
- Spectral gaps of Dirac operators describing graphene quantum dots, Aarhus Universitet, June 29, 2016.
- Spectral gaps of Dirac operators describing graphene quantum dots, Seminario de Análisis y Geometría, PUC, Santiago, May 2, 2017.
- Spectral gaps of Dirac operators describing graphene quantum dots, Sesión Mathematical Physics, Mathematical Congress of the Americas, Montreal, July 26, 2017.
- Spectral gaps of Dirac operators describing graphene quantum dots, Seminario CAPDE, DIM UChile, Santiago, October 2, 2017.
- Non-existence of minimizers for the TFDW functional and related problems, PDEs sesión Encuentro SOMACHI, Talca, November 3, 2017.
- Non-existence of minimizers for the TFDW functional and related problems, EEQUADD Math-AmSud Workshop, Santiago, December 7, 2017.