

MARCO A. M. GUARACO

PERSONAL INFORMATION

Full Name: Marco Aurelio Méndez Guaraco

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EMPLOYMENT HISTORY

- **L.E. Dickson Instructor at The University of Chicago** - September 2016 - present
- **Member of the Institute for Advanced Study - Princeton** - Fall 2018
- **Junior Postdoc at IMPA** - Instituto Nacional de Matematica Pura e Aplicada -IMPA, Brazil.
April 2016 - August 2016

EDUCATION

- *Visiting Student Research Collaborator - Princeton University*, Department of Mathematics
September 2014 - March 2015 / September 2015 - March 2016. Advisor: Fernando Codá Marques.
- *PhD in Mathematics - IMPA* - Instituto Nacional de Matematica Pura e Aplicada, Brazil
2012-2016. Advisor: Fernando Codá Marques.
- *Master in Mathematics*. March 2012, **IMPA** Instituto Nacional de Matematica Pura e Aplicada, Brazil. Advisor: José Felipe Linares
- *Bachelor of Science*, Major in Mathematics. October 2009, **Universidad Simón Bolívar**, Venezuela. Advisor: Lázaro Recht.

TEACHING EXPERIENCE

- 2016-2018 - Instructor of Real Analysis I and II (Advanced sections) and Honors Calculus I and II, for undergrads at The University of Chicago.
- 2015 - Supervision of the online video program of the OBMEP - Brazilian Olympic program in Mathematics for High School Students.
- 2012-2015 - Instructor - PROFMAT - Masters Program for High School Teachers. Taught 6 courses in the program including: Problem Solving, Discrete Mathematics and Analytic Geometry.
- 2013 - Teaching Assistant - PDE course of the PhD Program at IMPA - Brazil

TEACHING EXPERIENCE (CONT.)

- 2004-2009 - Teaching Assistant of several Analysis courses for the Bachelor program in Mathematics - Universidad Simón Bolívar - Venezuela.

RESEARCH INTERESTS

Differential Geometry and Geometric Analysis. Calculus of variations. Variational theory of minimal hypersurfaces and semilinear parabolic and elliptic partial differential equations. Critical point theory of phase transitions, the Allen-Cahn equation and its relations to minimal hypersurfaces. Geometry of 3-dimensional hyperbolic manifolds.

PUBLICATIONS

1. Joint with J.E. Caramgo-Molina, "Instantons and phase transitions in De-Sitter space: $O(4)$ symmetry and dependence on true vacuum". *In preparation.*
2. Joint with V. Lima and F. Vargas Pallete, "Minimal surfaces and mean curvature flow in quasi-Fuchsian hyperbolic 3-manifolds". *In preparation.*
3. Joint with R. Caju, P. Gaspar and H. Matthiesen, "Ground states of semilinear elliptic equations". *In preparation.*
4. Joint with F. C. Marques and A. Neves, "Multiplicity one and strictly stable Allen-Cahn minimal surfaces". <https://arxiv.org/abs/1912.08997>
5. Joint with P. Gaspar, "The Weyl Law for the phase transition spectrum and the density of minimal hypersurfaces". *Geometric and Functional Analysis*. 29.2 (2019): 382-410.
6. Joint with P. Gaspar, "The Allen-Cahn equation on closed manifolds." *Calculus of Variations and Partial Differential Equations* 57.4 (2018): 101.
7. "Min-max for phase transitions and the existence of embedded minimal hypersurfaces." *Journal of Differential Geometry* 108.1 (2018): 91-133.

MINICOURSES AND VISITS

- 2019- Minicourse: Minimal surfaces and Mean Curvature Flow in quasi-Fuchsian manifolds - I Congress on Geometric Analysis - Universidad de Cádiz, Spain.
- 2019 - Minicourse: The Allen-Cahn equation and Minimal Hypersurfaces - 9th Workshop on Differential Geometry - Maceió, Brazil.
- 2018 - Reading group: The Allen-Cahn equation and Minimal Hypersurfaces- IAS, Princeton
- 2018 - Visitor at FIM, ETH - Zurich from mid-March to mid-April

- 2017 - Minicourse: Phase Transitions and Minimal Surfaces - Fourth Taiwan International Conference on Geometry, Taipei, Taiwan.

INVITED TALKS

- 2019 - I Congress on Geometric Analysis - Universidad de Cadiz, Spain
- 2019 - Geometry, Topology & Dynamics Seminar - UIC, Chicago, IL
- 2019 - Analysis Seminar - UNAM, Mexico
- 2019 - Analysis Seminar - CIMAT - Guanajuato, México
- 2019 - 9th Workshop on Differential Geometry - Maceió, Brazil
- 2019 - Geometry and PDE in front of the Alhambra - Universidad de Granada, Spain
- 2018 - Geometry Seminar - Universidad de Granada, Granada, Spain.
- 2018 - Analysis Seminar - ETH, Zürich, Switzerland
- 2018 - AMS National Meeting - Geometric Analysis Section, San Diego, CA
- 2017 - Geometry and Topology Seminar - University of Wisconsin at Madison, USA
- 2017 - Fourth Taiwan International Conference on Geometry, Taipei, Taiwan.
- 2017 - Differential Geometry & Geometric Analysis Seminar - Princeton University, NJ, USA
- 2016 - VI Workshop on Differential Geometry - Maceió, Brazil
- 2016 - Geometry and Topology Seminar - UPenn, Philadelphia, USA.
- 2016 - Mathematics Department Colloquium - Universidad Simón Bolívar - Caracas
- 2016 - XIX School of Differential Geometry - Rio de Janeiro, Brazil
- 2016 - Nonlinear PDE's @ IMPA - Rio de Janeiro, Brazil
- 2015 - Bay Area Differential Geometry Seminar (BADGS) - MSRI - Berkeley - CA, USA
- 2015 - Geometric Analysis and PDE Seminar - University of Cambridge - UK.
- 2015 - Geometry and Analysis Seminar - Imperial College London - UK
- 2015 - Differential Geometry & Geometric Analysis Seminar - Princeton University - NJ, USA
- 2015 - Analysis and Geometry Seminar - Columbia University - New York, USA.
- 2015 - Seminario de Geometria Diferencial - IMPA - Rio de Janeiro
- 2015 - Differential Geometry Seminar - (USP) Universidade de São Paulo - São Paulo, Brazil
- 2015 - Summer school on multiscale and geometric analysis - Hokkaido University - Japan

SERVICES

Institute for Advanced Study (IAS)

- Organizer of the reading group **Allen-Cahn and Ginzburg/Landau** (Fall 2018) consists of weekly meetings of 2 hours in which leading edge researchers explained recent advances of the theory to Members and Guests of IAS.

The University of Chicago

- Co-organizer of the **Geometric Analysis Seminar** (2016-2019)
- Co-organizer of the conference **Geometry Analysis Day** - annual event shared between The University of Chicago and Northwestern University.
- Participation in the Summer **REU program** - 2017, 2018. Giving general talks and supervising reading groups on Geometric Measure Theory.

Universidad Simón Bolívar (Caracas, Venezuela)

- Organizer of a conference in honor of Prof. Lázaro Recht (2010)

Article Reviews

- Mathematische Annalen.
- Journal of Differential Geometry.