

Rafael Díaz Hernández Rojas

Curriculum Vitae

Education

- 2009–2014 **B. Sc.: Physics**, *Universidad Nacional Autónoma de México (UNAM)*, Mexico City, **Final grade: 9.97** (out of 10).
Thesis: *Respuesta Plasmónica de Partículas Anidadas usando Medio Efectivo* (Plasmonic Response of Nested Nanoparticles using Effective Medium Theory)
- 2015–2017 **M. Sc.: Physics**, *Universidad Nacional Autónoma de México (UNAM)*, Mexico City, **Final grade: 9.33** (out of 10).
Thesis: *Mejora en la caracterización de la aleatoriedad usando selección Bayesiana de modelos* (Improving randomness characterization through Bayesian model selection)

Distinctions

- 2014 **B. Sc. degree attained with Honorable Mention**, bestowed by the UNAM's Faculty of Sciences.
- 2015 **"Juan Manuel Lozano Mejía" Diploma**, bestowed by UNAM's Physics Institute, (Bachelor Level).
Distinction for an outstanding graduation thesis. Title: *Respuesta Plasmónica de Partículas Anidadas usando Medio Efectivo* (Plasmonic Response of Nested Nanoparticles using Effective Medium Theory)
- 2017 **M. Sc. degree attained with Honorable Mention**, bestowed by the UNAM's Physics Institute.
- 2017 **"Juan Manuel Lozano Mejía" Medal**, bestowed by UNAM's Physics Institute, (Master in Science Level).
Distinction for the best thesis of the year. Title: *Mejora en la caracterización de la aleatoriedad usando selección Bayesiana de modelos* (Improving randomness characterization through Bayesian model selection)

Publications

- [1] Rafael Diaz-H.R, Raul Esquivel-Sirvent, and Cecilia Noguez. "Plasmonic Response of Nested Nanoparticles with Arbitrary Geometry". In: *The Journal of Physical Chemistry C* 120.4 (2016), pp. 2349–2354.
- [2] Rafael Díaz Hernández Rojas, Aldo Solís, Alí M. Angulo Martínez, Alfred B. U'Ren, Jorge G. Hirsch, Matteo Marsili, and Isaac Pérez Castillo. "Improving randomness characterization through Bayesian model selection". In: *Scientific Reports* 7.1 (June 8, 2017), p. 3096. ISSN: 2045-2322.

Professional Experience

- 2012–present **Associate Student**, *Physics Institute, UNAM*, Mexico City.
From 2012–2014 I was affiliated at the Solid State Department. Currently, I am affiliated to the Complex Systems Department.

2014–2015 **Collaborator**, *Project: Investigation of Plasmon-Enhanced Visible Light Photoactivity of Titanium Dioxide Photoelectrodes for Solar Water Oxidation in collaboration with the University of California, as part of the program UC MEXUS-CONACYT.*

2014–2016 **Teacher Assistant**, *Faculty of Sciences, UNAM, Mexico City.*
Courses: *Electromagnetism* (Spring 2014), *Computational Physics* (Fall 2014), *Mechanics* (Spring 2015), *Quantum Mechanics* (Fall 2015), *Electromagnetism* (Spring 2016), *Thermodynamics* (Fall 2016).

International Experience

January–June, 2013 **One semester academic exchange**, *Univeristy of California, Santa Cruz.*
Sponsored by Fundación UNAM and Fundación Televisa (\$10,000 USD grant).

Workshops and Schools

- July 3–28, 2009 **Sumer School**, *International Summer Science Institute at the Weizmann Institute of Science*, Rehovot, Israel.
- June 18-29, 2012 **Summer School**, *20th Summer School on Physics*, Mexico City and Cuernavaca, Morelos, organized by the UNAM's Physics Institute, Institute of Physical Sciences, and the Physics Graduate Program.
- October 6-17, 2012 **Workshop**, *Pan-American Advanced Institute "Frontiers of Casimir Physics"*, Ushuaia, Argentina, organized by Indiana University – Purdue University Indianapolis.
- April 25–May 20, 2016 **Spring School**, *5th Spring College on the Physics of Complex Systems*, Trieste, Italy, organized by The "Abdus Salam" International Centre for Theoretical Physics.
- September 26-30, 2016 **School**, *XI Mexican School on Statistical Physics*, Guanajuato, Guanajuato, Mexico, organized by the Mexican Physics Society.
- April 10–May 5, 2017 **Spring School**, *6th Spring College on the Physics of Complex Systems*, Trieste, Italy, organized by The "Abdus Salam" International Centre for Theoretical Physics.

Seminars and Posters Presentations

1. November, 2007 **Poster Presentation**, *50th National Physics Congress*, Boca del Río, Veracruz, México, organized by the Mexican Physics Society.
Work: [Variables that Influence the Functioning of a Thermoacoustic Resonator](#)
2. June, 2014 **Talk**, *Modern Physics Laboratories microCongress*, UNAM, Mexico City, organized by the Physics Department of UNAM's Faculty of Sciences.
Title: [Random Lasers](#)
3. January, 2015 **Poster Presentation**, *8th Workshop of Molecular and Condensed Matter Physics*, Cuernavaca, Morelos, Mexico, organized by the Universidad Autónoma del Estado de Morelos.
Work: [Optical Properties of Nested Nanoparticles using Effective Medium Theory](#)
4. August 16–20, 2015 **Poster Presentation**, *XXIV International Materials Research Congress*, Cancun, Mexico, organized by The Materials Research Society and the Mexican Materials Society.
Work: [Mathematical Aspects of Recursive Effective Medium Theories in Layered Nanoparticles](#) (This work obtained the **second place** during the posters contest session.)
5. August 16–20, 2015 **Poster Presentation**, *XXIV International Materials Research Congress*, Cancun, Mexico, organized by The Materials Research Society and the Mexican Materials Society.
Work: [Numerical Calculation of Plasmonic Response of Nested Nanoparticles of Complex Geometry](#)

6. November 2015 **Poster Presentation**, “Open Doors Day” at the Physics Institute, UNAM, Mexico City.
Work: [Mathematical Aspects of Recursive Effective Medium Theories in Layered Nanoparticles](#)
7. December 8, 2015 **Talk**, XIII Congress of the Physics Graduate Students, Mexico City, Mexico.
Title: [Model Selection using Bayesian Inference and an Application to Random Bits Sequences](#).
8. February 18, 2016 **Talk**, Seminar of the High Energy Physics and Gravitation Department, Nuclear Sciences Institute, UNAM, Mexico City, Mexico.
Title: [Model Selection using Bayesian Inference and an Application to Random Bits Sequences](#).
9. April 25–May 20, 2016 **Poster Presentation**, 5th Spring College on the Physics of Complex Systems, ICTP, Trieste, Italy.
Work: [Randomness Characterization through Bayesian Inference. An application to bits sequences](#).
10. September 26-30, 2016 **Poster Presentation**, XI Mexican School on Statistical Physics, Guanajuato, Guanajuato, Mexico.
Work: [Randomness Characterization through Bayesian Inference. An application to bits sequences](#).
11. September 26-30, 2016 **Poster Presentation**, XI Mexican School on Statistical Physics, Guanajuato, Guanajuato, Mexico.
Work: [Generalized Szilard’s Engine. An information theoretic approach](#).
12. December 9, 2016 **Talk**, XIV Congress of the Physics Graduate Students, Mexico City, Mexico.
Title: [Image Reconstruction using the Expectation Propagation Algorithm](#).
13. March 27, 2017 **Seminar**, Students Seminar of the Physics Institute, Mexico City, Mexico.
Work: [Randomness Characterization using Bayesian Model Selection](#).
14. April 10–May 5, 2017 **Poster Presentation**, 6th Spring College on the Physics of Complex Systems, ICTP, Trieste, Italy.
Work: [Expectation Propagation for Image Reconstruction](#)
15. December 7, 2017 **Talk**, XV Congress of the Physics Graduate Students, Mexico City, Mexico.
Title: [Complete statistics of a 1d Coulomb gas with an arbitrary potential](#).

Physics Contests (Undergraduate Level)

State Physics Olympiads

- 2006 **Metropolitan Contest of Talented Students on Physics**, Mexico City, Mexico, organized by the Mexican Physics Society, **First Place**.
- 2006 **17th Metropolitan Physics Olympiad**, Mexico City, Mexico, organized by the Mexican Physics Society, **First Place**.
- 2007 **18th Metropolitan Physics Olympiad**, Mexico City, Mexico, organized by the Mexican Physics Society, **First Place**.
- 2008 **19th Metropolitan Physics Olympiad**, Mexico City, Mexico, organized by the Mexican Physics Society, **First Place**.

National Physics Olympiads

- July, 2006 **2nd Second National Contest of Talented Students on Physics**, Mexico City, Mexico, organized by the Mexican Physics Society, **First Place**.
- November, 2006 **17th National Physics Olympiad**, Durango, Durango, Mexico, organized by the Mexican Physics Society, **Honorable Mention**.
- November, 2007 **18th National Physics Olympiad**, Tuxtla Gutiérrez, Chiapas, Mexico, organized by the Mexican Physics Society, **Bronze Medal**.
- November, 2008 **19th National Physics Olympiad**, Tampico, Tamaulipas, Mexico, organized by the Mexican Physics Society, **Gold Medal**.

International Physics Olympiads

- September, **12th Ibero-American Physics Olympiad**, Morelia, Michoacán, Mexico, **Silver Medal**.
2008

Experimental Contests

- 2007 **17th National Contest of Devices and Experiments in Physics**, Culiacán, Sinaloa, Mexico, organized by the Mexican Physics Society, **First Place**.
Work: [Variables that Influence the Functioning of a Thermoacoustic Resonator](#)
- 2007 **National ExpoScience, Natural and Exact Sciences Category**, Puebla, Puebla, Mexico, **First Place**.
Work: [Variables that Influence the Functioning of a Thermoacoustic Resonator](#)
- 2008 **16th University Contest "Science Fair"**, Experimental Research Category, Mexico City, Mexico, organized by UNAM, **First Place**.
Work: [Variables that Influence the Functioning of a Thermoacoustic Resonator](#)
- 2008 **4th Latin American ExpoScience**, Lima, Peru, **Invited exhibitor**.
Work: [Variables that Influence the Functioning of a Thermoacoustic Resonator](#)
- 2009 **Centro Universitario Anglo Mexicano's Research Congress**, Cuernavaca, Morelos, Mexico, **First Place**.
Work: [Medium with Variable Refractive Index](#)

Updated: April 5, 2018