Luis Enrique Fernández Machado
Curriculum Vitae

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Personal Information

Date of Birth: October 24, 2000
Place of Birth: Havana, Cuba

Education

October 1st, 2025 - Today: **Ph.D. student at the CNRS of Université d'Orléans and at the "École Nationale des Ponts et Chaussées" (ENPC)**.

Supervisors: Ph.D. Romain Abraham (Professor at Université d'Orléans).
Ph.D. Jean-François Delmas (Professor at ENPC).

September, 2024 - September, 2025: **Double Master's degree in Mathematics and Computer Science** (Math-Info Program) at Université Gustave Eiffel.

Master GPA: **17.5/20** Mention: "**Très bien**"

2019-2024: **Bachelor Degree in Mathematics**
University of Havana
GPA: **4.93/5.00**

2017,2018: **National Cuban Training Center for International Olympiads**.
Every year during 3 months intensive training in Number Theory, Combinatorics, Algebra and Geometry.

2016-2018: **High School Institute for Exact Sciences (IPVCE) Vladimir Ilich Lenin**, Havana, Cuba.

2015-2016: **Training Center for National Olympiads of the High School Institute for Exact Sciences (IPVCE) Ernesto Guevara de la Serna**, Villa Clara, Cuba.

Research Experience

- (May 12th, 2025-August 15th, 2025): Internship at the "Center for Training and Research in Mathematics and Scientific Computing" (CERMICS) in the "École Nationale des Ponts et Chaussées" (ENPC).
  The research work was focused on studying the fundamental limits for the recovery of communities in random graphs models such as the *Labeled Stochastic Block Model* (LSBM). Specifically, we worked on determining the fundamental limits for the existence of *strongly consistent* and *consistent* estimators of the node labeling in the *Labeled Stochastic Block Model* when the number of communities (blocks) depends on the number of vertices and is unbounded. We used an information-theoretic approach based on the Rényi divergence and the f–divergences.
  Supervisor: Ph.D. Jean-François Delmas (Professor at ENPC).
- 2023-2024: Work on the project *"**Wavelets, frames, spectral techniques, partial differential equations, and scientific machine learning in image analysis**"* of the National Program of Basic Sciences of the Ministry of Science, Technology and Environment.
  Specifically, I work on improving the Mean Shift Iterative Algorithm for images segmentation and filtering by the introduction of an algebraic structure for images with the goal of creating a new

similarity index between images and using it as stopping criteria for Mean Shift Algorithms.
Supervisor: Ph.D. Ángela M. León Mecías (Professor at University of Havana).

- 2024: BSc Thesis: *"Quasi-loop structure for a new similarity index between images. An application to Mean Shift Iterative Algorithm"*.
Supervisor: Ph.D. Ángela M. León Mecías (Professor at University of Havana).

- 2023: *"Study of a new model of regular random graphs"*.
In this project, we focused on a new model of regular random graphs that we called the "Regular Stochastic Model by Superposition". I proved the identifiability (using total variation distance) from the uniform model and studied certain relationships with other random graph models.
Supervisors: Ph.D. Gerandy Brito (Lecturer at Institute of Technology of Georgia).
Ph.D. José Valdés Castro (Professor at University of Havana).

- 2020-2021: *"Study of sets with the form* $\{(x^a - y^b - c), x, y \in \mathbb{Z}_m\}$ *under certains conditions for* a, b, c, m*"*.
Supervisor: Ph.D. Rita Roldán Inguanzo (Professor at University of Havana).

Publications and preprints

1. **Fernández L.** *"Introduction and solution of the Problem of the reduced catalan"*, (2025) *Ciencias Matemáticas* (https://revistas.uh.cu/rcm/article/view/9749).

Presentations

Master thesis for the double degree in Mathematics and Computer Science 2025.
Title: *Community detection in general stochastic block models.*

16-th International Conference on Operation Research 2024.
Talk: *Quasi-loop structure for a new similarity index between images. An application to the Mean Shift Iterative Algorithm.*

Diploma thesis for the Bachelor Degree in Mathematics 2024.
Title: *Quasi-loop structure for a new similarity index between images. An application to Mean Shift Algorithm.*

Mathematical Modeling and Numerical Simulation in Medicine CIMPA School 2023.
Talk: *New algebraic structure for the detection of similarity between images.*

MATCOM Scientific Student Symposium at the University of Havana 2023.
Talk: *New algebraic structure for the detection of similarity between images*
(First Prize at the Symposium).

University of Havana Scientific Student's Forum 2022.
Talk: *Reduced catalans, potentially complex and rebels.*

MATCOM Scientific Student Symposium at the University of Havana 2021.
Talk: *Reduced catalans, potentially complex and rebels (Best Scientific Exposition Award and Silver Medal at the Symposium).*

Teaching and service

- (May 13th, 2024 - August, 2024) Junior professor in *"Measurement and Integration Theory"*
4th year Bachelor in Mathematics
Faculty of Mathematics and Computer Sciences, University of Havana
- (January 29th, 2024 - May 6th, 2024) Junior professor in *"Introduction to Mathematical Analysis"*
1st year Bachelor in Mathematics
Faculty of Mathematics and Computer Sciences, University of Havana

- (February 2022-February 2023) Student Teaching Assistant in *"Probability Theory"*
  2nd year Bachelor in Mathematics
  Faculty of Mathematics and Computer Sciences, University of Havana
- (October 2021-February 2022) Student Teaching Assistant in *"Linear Algebra"*
  1st year Bachelor in Mathematics
  Faculty of Mathematics and Computer Sciences, University of Havana
- (2019) Teacher in Number Theory for students of *Cuban National Team for International Olympiads*
- Contributions to create the problems bank for *Central America Mathematics Olympiad 2018*
- Contributions to *National Cuban High School Mathematics Olympiads* through the creation of exercises

Honors

2025- **Recipient of the Ph.D. grant of the COFUND program *MathPhDinFrance***[1]

2024- **Participation in the 11th Heidelberg Laureate Forum** [2]

2024- **Recipient of the Labex Bézout Scholarship**

2024- **Relevant Bachelor's Thesis Award** [3]

2024- **Bachelor Degree in Mathematics with honors** [4]

2024- **Scientific Merit Award** granted by the Rector of the University of Havana

2024- Award for the **"Most outstanding student in the academic sphere"** of the Faculty of Mathematics and Computer Science at the University of Havana

Awards in Mathematics Competition

2023- **Bronze Medal** at the *Ibero-American University Mathematics Olympiad*[5]

2023- **Gold Medal** at the national ranking of the *Ibero-American University Mathematics Olympiad*

2023- **First Prize** at the *Prize Exam of Functional Analysis*

2023- **Gold Medal** at the *National University Mathematics Olympiad Raimundo Reguera*

2022- **Third Prize** at the *International Mathematics Competition for University Students organized by the University College of London*[6]

2022- **Second Prize** at the *Prize Exam of Probability Theory*

[1] *MathPhDinFrance* is managed by the "Fondation Sciences Mathématiques de Paris " (FSMP) and offers 24 Ph.D. fellowships in Mathematical Sciences in France for international students from all over the world.

[2] This is a very important event where recipients of the most prestigious awards in mathematics and computer science, the Abel Prize, ACM A.M. Turing Award, ACM Prize in Computing, Fields Medal, IMU Abacus Medal and Nevanlinna Prize, meet 200 selected young researchers from all over the world among more than 1000 applicants (https://www.heidelberg-laureate-forum.org/).

[3] This award is given by the Scientific Council of the Faculty of Mathematics and Computer Science at the University of Havana to the most outstanding Bachelor's theses of the year.

[4] I received the Gold Bachelor's Degree in Mathematics of the University of Havana, which is an award to students with a grade point average above 4.75 on a 5-point scale (typically between 5% and 15% of the graduating students).

[5] In this mathematical competition, the national committee of each country evaluates the exams and selects the best ones to be sent to the international committee to compete for medals at the Ibero-American level, representing their country. The final score in the Ibero-American medal table for a student is the result of adding their scores in the 4 problems in which they achieved the highest scores. For Ibero-American level medals in 2023, see `https://paginas.cimpa.ucr.ac.cr/Olimpiadas/images/documentos_olimpiadas/Medallero/Resultados_2023_Medallero.pdf` Additionally, the Cuban Society of Mathematics and Computing creates a national ranking based on which it awards medals to Cuban students with the best performance in the competition.

[6] `https://www.imc-math.org.uk/?act=results&by=sum&year=2022&onl=3`.

2021- **Gold Medal** at the *National University Mathematics Olympiad Raimundo Reguera*

2021- **Bronze Medal** at the *Ibero-American University Mathematics Olympiad*[7]

2021- **Gold Medal** at the national ranking of the *Ibero-American University Mathematics Olympiad*

2021- **Third Prize** at the *International Mathematics Competition for University Students organized by the University College of London*[8]

2020- **Perfect Gold Medal** at the *Cuban National Mathematics Olympiad* (Highest Level) in honor of Luis Campistrou

2019- **Bronze Medal** at the *Ibero-American University Mathematics Olympiad*

2019- **Gold Medal** at the national ranking of the *Ibero-American University Mathematics Olympiad*

2018- **Silver Medal** at the *National Cuban High School Mathematics Olympiad*

2018- **Gold Medal** at the *National Knowledge Competition between High School Institutes of Exact Sciences* (Category: Mathematics)

2018- **Gold Medal** at the *Cuban National Mathematics Olympiad* (Highest Level of High School) in honor of Luis Campistrou

2017- **Silver Medal** at the *National Cuban High School Mathematics Olympiad*

Skills

- Programming in Python (matplotlib, numpy, random, pandas, scikit-learn)
- Spanish: Mother tongue
- English: Fluent

[7] For the Ibero-American level medals up to 2021, see `https://oimu.eventos.cimat.mx/oimu_anteriores`.
[8] `https://www.imc-math.org.uk/?act=results&by=sum&year=2021`.