

# HUGO DA CUNHA | Curriculum Vitæ

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## Today

PhD Student at Institut Camille Jordan (Villeurbanne, Lyon, France) under the direction of Marielle Simon and Clément Erignoux, working on "Anomalous boundary effects in kinetically constrained lattice gases".

## EDUCATION

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### At École Normale Supérieure (ENS) de Lyon

#### **LONG RESEARCH PROJECT (PLR)** 2023-2024

- Six-month research internship with Lu Xu at Gran Sasso Science Institute, L'Aquila, Italy to work on the effects of asymmetry on exclusion processes with boundaries.
- Four-month research internship with Marielle Simon and Clément Erignoux at Institut Camille Jordan, Villeurbanne, France

#### **SECOND YEAR OF MASTER'S DEGREE IN ADVANCED MATHEMATICS, PROBABILITY & STATISTICS** 2022-2023

Master's degree obtained with high honours

Four-month research internship with Marielle Simon and Clément Erignoux at Institut Camille Jordan, Villeurbanne, France to work on a Facilitated Exclusion Process with boundaries.

#### **FIRST YEAR OF MASTER'S DEGREE IN ADVANCED MATHEMATICS** 2021-2022

Specialization into Probability and PDE

Three-month internship with Patrícia Gonçalves at Instituto Superior Técnico, Lisbon, Portugal about large deviations in the context of interacting particle systems.

#### **BACHELOR'S DEGREE IN FUNDAMENTAL MATHEMATICS** 2020-2021

Bachelor's degree obtained with honours

Six-week internship with Hervé Le Meur and Denys Dutykh to make a theoretical and numerical study of a coupled PDE system with fractional derivative operators.

## Previous schooling

#### **"CLASSES PRÉPARATOIRES AUX GRANDES ÉCOLES" (CPGE)** 2018-2020

specialized in Physics and Chemistry

Lycée Blaise Pascal, Clermont-Ferrand, France

This is a two-year undergraduate intensive preparation for competitive nationwide examinations.

Participation to the International Chemistry Olympiad (IChO) : ranked 6th out of 309.

## PREPUBLICATIONS

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#### **"HYDRODYNAMIC LIMIT FOR AN OPEN FACILITATED EXCLUSION PROCESS WITH SLOW/FAST BOUNDARIES"** 2024

Hugo Da Cunha, Clément Erignoux and Marielle Simon

[arXiv:2401.16535](#)

submitted to the Springer journal "Communications in Mathematical Physics".

## TALKS

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**YOUNG RESEARCHERS IN APPLIED MATHEMATICS CONGRESS** October 30th, 2024  
"Hydrodynamic limit for a facilitated exclusion process with slow/fast boundaries" Lyon, France

**ICJ/UMPA PHD STUDENTS SEMINAR** October 21st, 2024  
"Limite hydrodynamique pour un processus d'exclusion facilité avec frontières ouvertes" Lyon, France

## JOURNÉE MATHÀLYON

Intervention with middle school students

to introduce mathematical research through hands-on activities and workshops

October 8th, 2024

Collège Sonia Delaunay, Villefontaine

## SMAQ SEMINAR (STOCHASTIC MODELLING IN L'AQUILA)

"Boundary effects in the Facilitated Exclusion Process"

Invitation to give a talk at the joint Probability Seminar between the University of L'Aquila and the Gran Sasso Science Institute.

March 18th, 2024

L'Aquila, Italy

## DIFFUSION OF MATHEMATICS : "CAN WE TRUST POLITICAL SURVEYS?"

Intervention in a High School

March 19th, 2022

Lycée Victor Duruy, Paris, France

## PARTICIPATIONS TO CONFERENCES AND WORKSHOPS

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### PARTICLE SYSTEMS AND PARTIAL DIFFERENTIAL EQUATIONS (PSPDE)

Twelfth edition

Presentation of a poster about the work done during the different research internships

September 9th-13th, 2024

Trieste, Italy

### BRAZILIAN SCHOOL OF PROBABILITY

Twenty-seventh edition

August 5th-9th, 2024

Salvador de Bahia, Brazil

### INTERACTIONS EDP/PROBABILITÉ :

Functional inequalities, optimal transport and particle systems

January 22nd-26th, 2024

CIRM, Marseille, France

### SUMMER SCHOOL "SAMPLING HIGH-DIMENSIONAL PROBABILITY MEASURES:

applications in (non)equilibrium molecular dynamics and statistics"

September 25th-27th, 2023

CERMICS, Marne-la-Vallée, France

### CONFERENCE ON STOCHASTIC PROCESSES AND THEIR APPLICATIONS (SPA)

Fortythird edition

Participation to the organization of this event.

July 24th-28th, 2023

Lisbon, Portugal

### 27ÈMES RENCONTRES ITZYKSON

Fluctuations far from Equilibrium

May 31st-June 2nd, 2023

Institut de Physique Théorique (IPHT), Gif-sur-Yvette, France

### WORKSHOP "ASYMMETRY IN INTERACTING PARTICLE SYSTEMS"

Microscopic and macroscopic effects

October 3rd-5th, 2022

INRIA Lille, France

### PARTICLE SYSTEMS AND PARTIAL DIFFERENTIAL EQUATIONS (PSPDE)

Tenth edition

June 27th-July 1st, 2022

Universidade do Minho, Braga, Portugal

## TEACHING EXPERIENCES

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### ORAL EXAMINATIONS AND PRACTICAL SESSIONS OF ANALYSIS AND ALGEBRA

for first- and second-year students

From October 2024

Université Lyon 1

### AUTHOR AT H&K PUBLISHING

Writing of solutions for the 2024 competitive exams for preparatory classes (CPGE)

May 2024

### "COLLEUR EN MATHÉMATIQUES"

Weekly oral interrogations in Mathematics

for students of "Classes préparatoires"

September 2022 – June 2023

Lycée aux Lazaristes-La Salle, Lyon, France

### MOCK ORAL EXAMINATIONS OF MATHEMATICS

for the preparation to competition

of students of "Classes préparatoires"

June 2023

Lycée Blaise Pascal, Clermont-Ferrand, France

## MINI-COURSE ABOUT LARGE DEVIATIONS

June 2022

in the context of the symmetric simple exclusion process

Instituto Superior Técnico, Lisbon, Portugal

within the probability research team. This mini-course was divided into four lectures: the first two were dedicated to give some generalities about large deviations in the case of sums of i.i.d. random variables and of discrete Markov chains ; The last two lectures were devoted to the case of the symmetric simple exclusion process.



### LANGUAGES

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<b>FRENCH</b>	Native speaker
<b>ENGLISH</b>	Cambridge Advanced C1 Certification
<b>PORTUGUESE</b>	Fluent
<b>ITALIAN</b>	Intermediate
<b>SPANISH</b>	Intermediate



### SOFTWARES

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<b>L<sup>A</sup>T<sub>E</sub>X</b>	Fully proficient
<b>PYTHON</b>	Proficient

**Fields of interest** – Probability Theory, Statistical Mechanics, Partial Differential Equations, Numerical Analysis