

# Claudia Rella

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## EDUCATION

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**Master of Science in Mathematical and Theoretical Physics** – Distinction Sep 2018 – Jul 2019  
*Mathematical Institute and Department of Physics, St John's College, University of Oxford, UK*

Thesis: *Motivic Amplitudes* supervised by Prof. Francis Brown.

Coursework in Physics: General Relativity – Relativistic Quantum Field Theory – Gauge Field Theory – Bosonic String Theory – The Standard Model and Beyond – Topological Quantum Field Theory – Topological Quantum Matter – Topological Quantum Computation – Radiative Processes and High-Energy Astrophysics.

Coursework in Mathematics: Groups Representations – Algebraic Geometry – Homology and Cohomology Theory.

**Bachelor of Science in Physics** – Summa cum Laude Sep 2015 – Jul 2018  
*Department of Physics, University of Rome La Sapienza, Italy*

Thesis: *Photonic Bloch Waves* supervised by Prof. Fabio Sciarrino.

Coursework in Physics: Classical, Analytical and Relativistic Mechanics – Inorganic Chemistry – Thermodynamics – Non-Relativistic Electromagnetism – Non-Relativistic Quantum Mechanics – Classical and Quantum Statistical Mechanics – Nuclear and Subnuclear Physics – Atomic and Molecular Physics – Optics and Photonics.

Laboratory Coursework: Mechanics – Thermodynamics – Electronics – Signals and Systems – Optics.

Coursework in Mathematics: Number Theory – Linear Algebra – Groups, Rings and Fields – Galois Theory – Modules and Algebras – Representation Theory – Real Analysis – Complex and Functional Analysis – Affine and Projective Geometry – Differential Geometry – General, Algebraic and Differential Topology – Probability Calculus.

Coursework in Informatics: C Programming Language – Numerical Analysis – Algorithms.

## RESEARCH EXPERIENCE AND INTERNSHIPS

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**Graduate Research Student – Master Class in Mathematical Physics** Sep 2019 – present  
*Department of Mathematics, University of Geneva, Switzerland*

**Software Engineering Intern** 2019, Jul  
*Pangea Formazione, Rome, Italy*

Specific contributions: Contributed to Deep Learning predictive model for preventative maintenance of large infrastructures equipped with alarm nets. Project implemented using Bayesian Neural Networks and programming language R.

**Research Intern** 2017, Sep – Nov  
*LNF (National Laboratories of Frascati), INFN (National Institute of Nuclear Physics), Italy*

Specific contributions: Implemented Monte Carlo optical simulation of the SAC (Small-Angle Calorimeter) using software Geant4 and programming language C++. Characterised performance of PbF<sub>2</sub> crystal attached to Hamamatsu R13478UV photomultiplier tube. Part of the experimental project PADME (Positron Annihilation into Dark Matter Experiment).

## PUBLICATIONS

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*Characterization and Performance of PADME's Cherenkov-Based Small-Angle Calorimeter* 2019, Mar  
A. Frankenthal et al., Nuclear Instruments and Methods in Physics Research A, (vol. **919**, 1 March 2019, pages 89-97),  
<https://doi.org/10.1016/j.nima.2018.12.035>.

## TALKS

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**Research Seminar Lie Groups and Moduli Spaces** 2019, Nov  
*Department of Mathematics, University of Geneva, Switzerland*  
Invited talk on Motivic Amplitudes.

**Conference on Representation Theory and Integrable Systems** 2019, Aug  
*ETH, Zurich, Switzerland*

Contributed talk on Motivic Amplitudes.

**PADME Weekly Meeting**

*INFN-LNF, Frascati, Italy*

2017, Dec

Invited talk on Geant4 Monte Carlo optical simulation of PADME's SAC.

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**WORK AND TEACHING EXPERIENCE**

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**Lecturer on Topological Surfaces**

2019, Oct

*Master Class in Mathematical Physics – Department of Mathematics, University of Geneva, Switzerland*

Topics of lectures: Introduction to Topological Spaces – Hausdorff Separation Axiom – Connectedness and Compactness – Abstract Topological Manifolds and Surfaces – Normal Forms for Surfaces – Real Projective Plane  $\mathbb{RP}^2$  in detail.

**Specialist Academic Editor in Mathematics and Statistics**

2019, Oct

*AsiaEdit, Hong Kong*

**Lecturer on Riemannian Geometry**

2018, Mar – May

*Excellence Program in Physics – Department of Mathematics, University of Rome La Sapienza, Italy*

Topics of lectures: Introduction to Riemannian Geometry – Riemannian Manifolds with Non-Positive Curvature – Jacobi Fields and Conjugate Points – Cartan-Hadamard Theorem – Killing Fields.

**Marker of the Mathematics Admission Test**

2018, Nov

*Mathematical Institute, University of Oxford, UK*

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**ACADEMIC ACHIEVEMENTS AND SCHOLARSHIPS**

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**Excellence Fellowship**

2019

*NCCR (National Centre of Competence in Research) SwissMAP, Switzerland*

**Degree Prize for Distinction**

2019

*St. John's College, University of Oxford, UK*

**Torno Subito Scholarship**

2018

*Department of Education, Research and University, Regione Lazio, Italy*

**Best Student Award for the Course in Nuclear and Subnuclear Physics**

2018

*University of Rome La Sapienza and INFN, Italy*

Visiting student at CERN (European Organisation for Nuclear Research), Switzerland, in Sep 2018.

**Summer Student Scholarship**

2017

*INFN, Italy*

**Excellence Program**

2016 – 2018

*Department of Physics, University of Rome La Sapienza, Italy*

Completion of advanced modules under individual supervision: Numerical Semigroups – Real Analysis – Riemannian Geometry – Lie Groups and Lie Algebras.

**Deserving Student Scholarship**

2015 – 2018

*University of Rome La Sapienza, Italy*

**Scholarship for Undergraduate Applicants in Mathematics**

2015 – 2018

*INdAM (National Institute of High Mathematics), Italy*

Declined as a consequence of the enrolment to the BSc in Physics.

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**ATTENDANCE AT CONFERENCES, WORKSHOPS, ETC.**

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**SwissMAP Winter School in Mathematical Physics (\*)**

2020, Feb

*Les Diablerets, Switzerland*

**6<sup>th</sup> SwissMAP General Meeting**

2019, Sep

*Villars-sur-Ollon, Switzerland*

**School on Modular Forms, Periods and Scattering Amplitudes**  
*ETH-ITS, Zurich, Switzerland*

2019, Feb

**Workshop on Quantum Foundations. New frontiers in testing quantum mechanics**  
*INFN-LNF, Frascati, Italy*

2017, Nov

**Workshop on Quantum Foundations. The physics of “what happens” and the measurement problem**  
*INFN-LNF, Frascati, Italy*

2017, May

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### SKILLS

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Programming Languages	C, C++, HTML, Perl, R, Python
Version-control Systems	Git
Data Analysis Software	MATLAB, ROOT, gnuplot
Simulation Software	Geant4
Italian	Native
English	Level C2 (CEFRL) - Cambridge ESOL Level 3 Certificate