

Claudia Rella

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EDUCATION

Doctor of Philosophy in Mathematical Physics

starting 2020, Oct

Department of Theoretical Physics, University of Geneva, Switzerland

Thesis: Supervised by Prof. Marcos Marino.

Affiliations: ERC Synergy Grant ReNewQuantum – National Centre of Competence in Research SwissMAP.

Master of Science in Mathematical and Theoretical Physics – Distinction

2018, Oct – 2019, Jun

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 – Algebraic Topology.

Bachelor of Science in Physics – Summa cum Laude

2015, Oct – 2018, Jun

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 Informatics: C Programming Language – Numerical Analysis – Algorithms.

Coursework in Mathematics: Linear Algebra – Real Analysis – Complex and Functional Analysis – Probability Calculus. Number Theory ^(*) – Groups, Rings and Fields ^(*) – Numerical Semigroups ^(*) – Galois Theory ^(*) – Modules and Algebras ^(*) – Representation Theory ^(*) – Lie Groups and Lie Algebras ^(*) – Affine and Projective Geometry ^(*) – Differential and Riemannian Geometry ^(*) – General, Algebraic and Differential Topology ^(*) – PDEs ^(*).

^(*): Extra-curricular coursework at Department of Mathematics.

RESEARCH EXPERIENCE AND INTERNSHIPS

Particle Physics Research Internship in Computing and Data Science

2020, Jul – Sep

NA62 @ CERN (European Organization for Nuclear Research), Geneva, Switzerland

Specific contributions: In progress.

Excellence Fellowship in Mathematical Physics

2019, Oct – 2020, Jun

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

Coursework: Random Matrix Theory – Random Growth.

Research: In progress.

Business Consulting Internship in Big Data and AI

2019, Jul – Aug

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 and customized to fit the specific needs of the commissioning telecom company. Pangea Formazione is a Big Data Analytics and AI company providing customised software for management consulting and training.

Particle Physics Research Internship in Simulation and Data Analysis

2017, Sep – Nov

PADME @ INFN (National Institute of Nuclear Physics) – LNF (National Laboratories of Frascati), Italy

Specific contributions: Contributed to Monte Carlo optical simulation of the Small-Angle Calorimeter of PADME's detector using simulation software Geant4 and programming language C++. Characterised performance of a single PbF₂ crystal attached to a Hamamatsu R13478UV photomultiplier tube using data analysis software ROOT. PADME (Positron Annihilation into Dark Matter Experiment) is a positron-on-target collision experiment searching for dark photon production at high intensity at the DAFNE Beam Test Facility.

PUBLICATIONS

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

Research Seminar on Lie Groups and Moduli Spaces 2019, Nov
Department of Mathematics, University of Geneva, Switzerland
Invited Talk: *Introduction to Motivic Feynman Integrals*.

Conference on Representation Theory and Integrable Systems 2019, Aug
ETH, Zurich, Switzerland
Contributed Talk: *Motivic Scattering Amplitudes*.

PADME Weekly Meeting 2017, Dec
INFN-LNF, Frascati, Italy
Invited Talk: *Monte Carlo Simulation of PADME's Small-Angle Calorimeter*.

TEACHING EXPERIENCE

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.

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.

ACADEMIC ACHIEVEMENTS AND SCHOLARSHIPS

Excellence Fellowship 2019
NCCR 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, Lazio, Italy

Best Student Award for the Course in Nuclear and Subnuclear Physics 2018
University of Rome La Sapienza and INFN, Italy

Summer Student Scholarship 2017
INFN, Italy

Excellence Program 2016 – 2018
Department of Physics, University of Rome La Sapienza, Italy

Deserving Student Scholarship 2015 – 2018
University of Rome La Sapienza, Italy

Scholarship for Undergraduate Applicants in Mathematics – Declined 2015 – 2018
INdAM (National Institute of High Mathematics), Italy

MEMBERSHIPS

Mentee of LeadTheFuture Mentorship Program
Invited Fellow of Italian Physics Society (SIF)

Sep 2019 – present
Jan 2019 – present

SKILLS

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