

Claudia Rella

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EDUCATION

Master of Science in Mathematical and Theoretical Physics – Distinction Oct 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 – Algebraic Topology.

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 – PDEs – 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

Graduate Research Student – Master Class in Mathematical Physics Sep 2019 – present

Department of Mathematics, University of Geneva, Switzerland

Coursework (up to Jan 2020): 2D Random Growth – Random Matrices.

Research (up to Jan 2020): Motivic Periods and Feynman Amplitudes in collaboration with Prof. Francis Brown, University of Oxford – Effective Field Theories and Positivity Bounds in collaboration with Prof. Francesco Riva, University of Geneva.

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 PbF₂ crystal attached to Hamamatsu R13478UV photomultiplier tube. Part of the experimental project PADME (Positron Annihilation into Dark Matter Experiment).

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 Amplitudes.

Conference on Representation Theory and Integrable Systems

ETH, Zurich, Switzerland

2019, Aug

Contributed Talk: Motivic Scattering Amplitudes.

PADME Weekly Meeting

INFN-LNF, Frascati, Italy

2017, Dec

Invited Talk: Monte Carlo Simulation of SAC.

WORK AND 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 (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, Lazio, Italy

Best Student Award – Course in Nuclear and Subnuclear Physics

2018

University of Rome La Sapienza and INFN, Italy

Specifics: 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

Specifics: Advanced modules on Numerical Semigroups – Real Analysis – Riemannian Geometry – Lie Groups and Lie Algebras under individual supervision.

Deserving Student Scholarship

2015 – 2018

University of Rome La Sapienza, Italy

ATTENDANCE AT CONFERENCES, WORKSHOPS, ETC.

Conference on Integrability, Anomalies and Quantum Field Theory (*)

2020, Feb

IHES, Paris, France

SwissMAP Winter School in Mathematical Physics (*)

2020, Feb

Les Diablerets, Switzerland

6th SwissMAP General Meeting

2019, Sep

Villars-sur-Ollon, Switzerland

School on Modular Forms, Periods and Scattering Amplitudes

2019, Feb

ETH-ITS, Zurich, Switzerland

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

MEMBERSHIPS

Mentee of LeadTheFuture Mentorship Program

Sep 2019 – present

Invited Fellow of Italian Physics Society (SIF)

Jan 2019 – present

SKILLS

Italian Language

Native

English Language

Level C2 (CEFRL) - 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