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: 2D Random Growth – Random Matrices – (TBC).

Research: 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 – (TBC).

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_2 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 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 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 $\mathbb{R}\mathbf{P}^2$ 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 2017, Nov
INFN-LNF, Frascati, Italy

Workshop on Quantum Foundations. The physics of "what happens" and the measurement problem 2017, May
INFN-LNF, Frascati, Italy

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

(*): expected