Raphael S. Steiner, Ph.D.

Curriculum Vitae

Employment

2020–Present **Post-doctoral Researcher in Mathematics (Hermann-Weyl-Instructor)**, *Federal Institute of Technology (ETH)*, Zürich, CH.

2018–2020 **Post-doctoral Researcher in Mathematics (Member)**, *Institute for Advanced Study*, Princeton, USA.

2014–2018 **Ph.D. in Mathematics**, *University of Bristol*, Bristol, UK.

2009, 2010 **IT-Support Internship**, *Baloise Insurance/Bank SoBa*, Basel, CH.

Job Qualifications

- Mathematical expertise in automorphic forms and analytic number theory, in particular the use of harmonic analysis, spectral theory, and Fourier analysis with extended knowledge in dynamical systems, measure/probability theory, representation theory, and Lie groups.
- Further broad mathematical knowledge, spanning anything from (Bayesian) statistics to numerical methods, and ability to absorb complex mathematical concepts quickly.
- Conducting research at the highest level, both independently and part of international collaborations, and presenting findings at esteemed conferences and institutions.
- Developing and managing multi-year research programmes, as well as securing independent funding for them.
- Teaching at a university level, including devising the curriculum and evaluation of a whole new course.
- Mentoring students, including supervising several Bachelor's theses.
- Devising research projects for Bachelor, Master, and Ph.D. students.
- Critical analysis of dense scientific papers/texts, in order to validify its veracity and integrity (peer-review).
- Various other academic tasks such as organising seminars, contributing to learning groups, etc.

Professional Development Courses

2021–2022 **Foundations of Teaching and Learning**, *Federal Institute of Technology (ETH)*, Zürich, CH.

Participants use core teaching and learning concepts in higher education to analyse their teaching experience within and beyond their own disciplines. Throughout the course, they plan their own teaching based on these insights.

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Education

2014–2018 **Ph.D. in Mathematics**, *University of Bristol*, Bristol, UK.
Three months were spent as a visitor at the MSRI programme "Analytic Number Theory" in Berkeley, CA, USA.

2012–2014 **M.Sc. in Mathematics**, *Federal Institute of Technology (ETH)*, Zürich, CH, *GPA – 5.74 / 6*.

2009–2013 **B.Sc. in Mathematics with Distinction**, *Federal Institute of Technology (ETH)*, Zürich, CH, *GPA – 5.85 / 6*.

Technical Skills

- **Python, MATLAB, Sage, Git, Jupyter Notebook**.
  - Excellent understanding of time and space complexity.
  - Good knowledge of common algorithms, data structures, modules (e.g. Numpy, Pandas, etc.).
  - Actively learning machine learning methods and implementations (tensorflow).
- **LaTeX**.
  - Avid user and proponent.
- **Other interests**.
  - Genuine interest in learning R, SQL, VBA, (or anything) given the application or need.

Languages

Swiss/German **Mother tongue.**

English **FCE, IELTS (GPA – 8.0);** *Resident in an English-speaking country for over 7 years.*

French **Matura (Secondary School Degree).**

Swedish **A2.**

Honours & Awards

2019 **Faculty of Science Commendation**, Bristol, UK.

2014 **Heilbronn Excellence Award**, Bristol, UK.

2009 **Best Interdisciplinary Achievement at Swiss Science Olympiads**, Bern, CH.

2009 **Bronze Medal at the International Mathematical Olympiad**, Bremen, DE.

2009 **Gold Medal at the Swiss Mathematical Olympiad**, Zürich, CH.

2009 **Gold Medal at the Swiss Physics Olympiad**, Zürich, CH.

2008 **Contestant at the International Mathematical Olympiad**, Madrid, ES.

2008 **Silver Medal at the Swiss Mathematical Olympiad**, Zürich, CH.

2007 **Contestant at the International Mathematical Olympiad**, Hanoi, VN.

2007 **Bronze Medal at the Swiss Mathematical Olympiad**, Zürich, CH.

Awarded Grants

2020 **Postdoc.Mobility**, *Swiss National Science Foundation*, (declined).

Selected Publications

- With applications to quantum computing: equidistribution of points on shrinking targets,
  - (with T. D. Browning and V. Vinay Kumaraswamy) *Twisted Linnik implies optimal covering exponent for* S^3, Int. Math. Res. Not. IMRN, 2019 1 (2019), 140-164.
- With applications to Ramanujan graphs, a type of highly efficient networking graphs (expander graph):
  - (with I. Khayutin and P. D. Nelson) *Theta functions, fourth moments of eigenforms, and the sup-norm problem II*, arXiv 2207.12351, submitted to Forum of Mathematics, Pi.
  - *Small diameters and generators for arithmetic lattices in* $\mathrm{SL}_2(\mathbb{R})$ *and certain Ramanujan graphs*, The Ramanujan Journal (2023).

Selected Invitations to International Conferences/Institutions

2023 **1st Analytic Number Theory & Automorphic Forms Conference in Patras**, Patras, GR.

2022 **Automorphic forms conference**, Budapest, HU.

2022 **Fantasy (Young Scholars in the Analytic Theory of Numbers and Automorphic Forms)**, Bonn, DE.

Institutions: **Stanford University, Princeton University, Imperial College London, Université Sorbonne Paris Nord, Institut Henri Poincaré, University of Göttingen**.

Volunteering/Community Engagement

2017 **Member of the problem selection committee and problem captain at the European Girls Math Olympiad**, Zürich, CH.

2014 **Leader at the International Math Olympiad**, Cape Town, ZA.

2011–2014 **Treasurer of the Swiss Mathematical Olympiad**.

2013 **Leader at the International Math Olympiad**, Santa Marta, CO.

2012 **Coordinator at the Middle European Math Olympiad**, Solothurn, CH.

2012 **Deputy leader at the European Girls Math Olympiad**, Cambridge, UK.

2011 **Observer B at the International Math Olympiad**, Amsterdam, NL.

2010–Present **Member of the Swiss Mathematical Olympiad Society**.
Active member from 2010–2014.

References

- Mentor and supervisor, *Prof. Emmanuel Kowalski*, Federal Institute of Technology (ETH), Zürich, CH, kowalski@math.ethz.ch, +41 44 632 3441.
- Former mentor and supervisor, *Prof. Peter Sarnak*, Institute for Advanced Study (IAS) & Princeton University, Princeton, USA, sarnak@math.princeton.edu, +1 609 258 4229.
- Ph.D. supervisor, *Prof. Tim D. Browning*, Institute for Science and Technology (IST), Klosterneuburg, AUT, timdanielbrowning@gmail.com, +43 2243 9000 2103.
- Collaborator and former mentor, *Prof. Paul D. Nelson*, Aarhus University, Aarhus, DK, paul.nelson@math.au.dk, +45 4080 2221.

- Former superior, *Laurent Steiner*, Agile Coach at Baloise Group, Basel, CH, laurent.steiner@baloise.com.