Elias Riedel Gårding — CV

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Born 1995-11-17, Stockholm

Research

Research interests: Generalised symmetry in quantum field theory.

2020-2022- **PhD research**
Paper to appear: *Defect groups of class $\mathcal{S}$ theories from the Coulomb branch.*

2019 **Research project in quantum computation**
Institute of Physics, École Polytechnique Fédérale de Lausanne (EPFL)
Supervisors: MER Dr Marc-André Dupertuis and MER Dr Nicolas Macris.
Paper [2] in *Entropy*.

2018 **Cambridge Mathematics Placement**
Department of Biochemistry, University of Cambridge
Supervisors: Dr Mark Bostock and Dr Daniel Nietlispach.
Research title: *Sparse sampling schedules for multidimensional NMR spectroscopy*

2017 **Summer Undergraduate Research Fellowship (SURF)**
Department of Electrical Engineering, California Institute of Technology (Caltech)
Supervisors: Dr Anatoly Khina and Asst Prof Victoria Kostina.
Paper [4] in *IEEE Transactions on Automatic Control*.

Education

2020- **PhD in Mathematics**
Uppsala University
Supervisor: Prof Michele Del Zotto.

2018-2020 **Master of Science in Engineering Physics (Theoretical Physics)**
Royal Institute of Technology (KTH)

2020
- Thesis [3] with the Division for Theoretical Physics, Uppsala University.

2019
- Exchange at École Polytechnique Fédérale de Lausanne (EPFL).

2017-2018 **Master of Advanced Studies in Applied Mathematics (Part III)**
Department of Applied Mathematics and Theoretical Physics (DAMTP), University of Cambridge
Pass with distinction.

2014-2017 **Bachelor of Science in Engineering Physics**
Royal Institute of Technology (KTH)
- Thesis [6] with the Department of Mathematics.
- Grade average: 4.966 (mandatory courses: 4.977) out of 5.000.

2016
- Summer school at the Joint Research Centre of Photonics (JORCEP), Zhejiang University.
  Project title: *All-Optical Wavelength Conversion for NRZ-OOK Signal based on Four-Wave Mixing in a Silicon Waveguide*

2011-2014 **Upper secondary education**
Norra Real, Stockholm

Talks

2023 ***Quantum anomalies and group cohomology***
PhD seminar, Department of Mathematics, Uppsala University.

2023 ***Higher gauging and non-invertible condensation defects***
Journal Club, Division for Theoretical Physics, Uppsala University.

2022 ***Cluster algebras and quivers from surfaces in physics***
PhD algebra seminar, Department of Mathematics, Uppsala University.

2022 ***Quantum field theories as cobordism functors***
PhD seminar, Department of Mathematics, Uppsala University.

2018 ***Symmetry made coherent***
Part III Lent Seminar, DAMTP, University of Cambridge.

2017 ***Geometric/Clifford algebra: A better vector algebra for physics***
Part III Michaelmas Seminar, DAMTP, University of Cambridge.

Teaching

2022- **Bachelor's thesis supervision**
Department of Mathematics, Uppsala University
Preliminary title: *Clifford algebras and spinors*

2020- **Bachelor's level mathematics courses**
Uppsala University:
- *Transform Methods*
- *Several Variable Calculus*, using a differentials-based approach [1].
- *Linear Algebra and Geometry I*
- *Algebra and Geometry*
- *Mathematics and statistics for biologists*

Awards

2019 **IBM Q Best Paper Award**
For the paper [2]; second prize.[1]

2018 **Jennings Prize for examination results**
Wolfson College, Cambridge

KTH scholarships for academic achievements
2017 • *Henrik Göransson's Sandviken Scholarship Foundation.*
2017 • *KTH's general student scholarships.*
2017 • *Kamreraren Hans Adolf Branders pensions- och stipendiestiftelse.*
2014 • *Adjunkt Klas Ryrbergs stipendiestiftelse.*

Standardised tests

2019 • GRE. Verbal reasoning: 170/170 (99th percentile).
Quantitative reasoning: 167/170 (90th percentile).
Analytical writing: 4.5/6.0 (81st percentile).
2019 • Physics GRE: 970/990 (93rd percentile).
2019 • TOEFL. Reading: 29/30, Listening: 30/30, Speaking: 23/30, Writing: 29/30.
2016 • IELTS: 8.5/9.0.

[1] Press release: https://www.ibm.com/blogs/research/2020/03/2019-ibmq-awards.
EPFL coverage: https://actu.epfl.ch/news/epfl-team-wins-2nd-place-in-ibm-quantum-competitio/.

Publications

[1] Elias Riedel Gårding. *Flervariabelanalys via differentialer*. 2023. URL: https://uppsala.box.com/s/4f2t13p2weavnhk2oazhtxgzgkg32jl2.

[2] Elias Riedel Gårding et al. "Bell Diagonal and Werner State Generation: Entanglement, Non-Locality, Steering and Discord on the IBM Quantum Computer". In: *Entropy* 23.7 (2021). ISSN: 1099-4300. DOI: 10.3390/e23070797. URL: https://www.mdpi.com/1099-4300/23/7/797.

[3] Elias Riedel Gårding. "Quantum structure of holographic black holes". MA thesis. KTH, Physics, 2020. URL: http://urn.kb.se/resolve?urn=urn%3Anbn%3Ase%3Akth%3Adiva-284694.

[4] Anatoly Khina, Elias Riedel Gårding, Gustav M. Pettersson, Victoria Kostina, and Babak Hassibi. "Control Over Gaussian Channels With and Without Source–Channel Separation". In: *IEEE Transactions on Automatic Control* 64.9 (2019), pp. 3690–3705. DOI: 10.1109/TAC.2019.2912255.

[5] Elias Riedel Gårding. "Our Theory of Very Nearly Everything". In: *Plus Magazine* (2019). URL: https://plus.maths.org/content/our-theory-very-nearly-everything-particles.

[6] Elias Riedel Gårding. *Geometric algebra, conformal geometry and the common curves problem*. 2017. URL: http://urn.kb.se/resolve?urn=urn%3Anbn%3Ase%3Akth%3Adiva-210866.