Simon Larson — Curriculum Vitae

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Personal information

Born:	December 28, 1990 in Söraby, Sweden
Address:	Chalmers University of Technology and the University of Gothenburg Department of Mathematical Sciences Gothenburg, 412 96, Sweden
Email:	larsons@chalmers.se
Website:	www.math.chalmers.se/∼larsons
Languages:	Swedish (first language), English (fluent).

Employment

Oct 2024–	Associate Senior Lecturer at the University of Gothenburg, Sweden.
2021–Present	Postdoc at the University of Gothenburg, Sweden. In part funded by a fellowship from the Knut and Alice Wallenberg foundation.
2022 Aug-Dec	Junior fellow at institut Mittag–Leffler, Stockholm, Sweden. Part of program *Geometric aspects of nonlinear partial differential equations.*
2019–2021	Postdoc with Rupert Frank at California Insitute of Technology, Pasadena USA. Funded by a fellowship from the Knut and Alice Wallenberg foundation.

Education

2019 Ph.D. in mathematics, KTH Royal Institute of Technology, Stockholm.
Advisor Ari Laptev. Date of degree 27 June 2019.
Thesis title: *Asymptotic and universal spectral estimates with applications in many-body quantum mechanics and spectral shape optimization*

2014 M.Sc. in Engineering Mathematics and Computational Science,
Chalmers University of Technology, Gothenburg. Thesis advisor Bo Berndtsson.

2012 B.Sc. in Engineering Mathematics, Chalmers University of Technology, Gothenburg.

Grants, awards & distinctions

2023 Starting grant from the Swedish Research Council (VR).
2022 Junior fellowship for program at Institut Mittag–Leffler, Stockholm.
2021 The Sparre Prize from the Royal Swedish Academy of Sciences.
2020 AMS–Simons travel grant.
2019 Stockholm Mathematics Centre Prize for Excellent Doctoral Dissertation.
2019 Postdoctoral fellowship from the Knut and Alice Wallenberg Foundation.
2018 The Markussens foundation research stipend.

Grants for research visits, conferences, etc. have been awarded from the

- Knut and Alice Wallenberg Foundation (in 2016, 2019).
- Magnussons fund of the Royal Swedish Academy of Sciences (in 2015, 2016, 2017, 2022).

Publications & preprints

[20] (with R. Hynd, E. Lindgren) *On a Hardy–Morrey inequality*, arXiv preprint 2024.

[19] (with R. Hynd, E. Lindgren) *Decay of extremals for Morrey's inequality*, to appear in Arkiv för Matematik.

[18] (with P.-Z. Kow, M. Salo, H. Shahgholian) *Quadrature domains for the Helmholtz equation with applications to non-scattering phenomena*, Potential Analysis, vol. 60 (2024), 387–424.

[17] (with R. L. Frank) *An inequality for the normal derivative of the Lane–Emden ground state*, Advances in Calculus of Variations (published online).

[16] (with R. L. Frank) *Discrete Schrödinger operators with decaying and oscillating potentials*, Algebra i Analiz, vol. 35 (2023), no. 1, 304-420.

[15] (with R. L. Frank) *On the spectrum of the Kronig–Penny model in a constant electric field*, Probability and Mathematical Physics, vol. 3 (2022), no. 2, 431–490.

[14] *A sharp multidimensional Hermite–Hadamard inequality*, International Mathematics Research Notices IMRN, vol. 2022 (2022), no. 2, 1297–1312.

[13] (with R. L. Frank) *Two consequences of Davies's Hardy inequality*, Functional Analysis and Its Applications, vol. 55, no. 2 (2021), 174–177.

[12] (with R. L. Frank) *Semiclassical asymptotics for a class of singular Schrödinger operators*, Partial Differential Equations, Spectral Theory, and Mathematical Physics, 155–176, EMS Ser. Congr. Rep., Eur. Math. Soc., Berlin, 2021.

[11] (with D. Lundholm, P. T. Nam) *Lieb–Thirring inequalities for wave functions vanishing on the diagonal set*, Annales Henri Lebesgue, vol. 4 (2021), 251–282.

[10] (with T. Beck, B. Brandolini, K. Burdzy, A. Henrot, J. J. Langford, R. Smits, S. Steinerberger) *Improved bounds for Hermite–Hadamard inequalities in higher dimensions*, The Journal of Geometric Analysis, vol. 31 (2021), 801–816.

[9] (with R. L. Frank) *On the error in the two-term Weyl formula for the Dirichlet Laplacian*, Journal of Mathematical Physics, vol. 61 (2020), 043504.

[8] (with R. L. Frank) *Two-term spectral asymptotics for the Dirichlet Laplacian in a Lipschitz domain*, Journal für die reine und angewandte Mathematik, vol. 766 (2020), 195–228.

[7] *Maximizing Riesz means of anisotropic harmonic oscillators*, Arkiv för Matematik, vol. 57 (2019), no. 1, 129–155.

[6] *Asymptotic shape optimization for Riesz means of the Dirichlet Laplacian over convex domains*, Journal of Spectral Theory, vol. 9 (2019), no. 3, 857–895. Erratum in vol. 11 (2021), no. 4.

[5] (with D. Lundholm) *Exclusion bounds for extended anyons*, Archive for Rational Mechanics and Analysis, vol. 227 (2018), no. 1, 309–365.

[4] (with K. Gittins) *Asymptotic behaviour of cuboids optimising Laplacian eigenvalues*, Integral Equations and Operator Theory, vol. 89 (2017), no. 5, 607–629.

[3] *On the remainder term of the Berezin inequality on a convex domain*, Proceedings of the American Mathematical Society, vol. 145 (2017), no. 5, 2167–2181.

[2] *Geometric Hardy inequalities for the sub-elliptic Laplacian on convex domains in the Heisenberg group*, Bulletin of Mathematical Sciences, vol. 6 (2016), no. 3, 335–352.

[1] *A bound for the perimeter of inner parallel bodies*, Journal of Functional Analysis, vol. 271 (2016), no. 3, 610–619. Corrigendum in vol. 279 (2020), no. 15.

Selected invited talks

In the past three years I have given more than fifteen invited seminar talks; including talks at the University of California at Irvine (online), Doppler Institute (online), University of Kentucky (online), University of Stockholm, University of Stuttgart, University of Tübingen, and University of Uppsala.

Recent invited talks at conferences and workshops include:

2023 Young researchers in PDEs, ICMAT-UAM, Madrid, Spain.
2023 Analysis and Mathematical Physics - AMP2023, a Marcus Wallenberg Symposium in memory of Sergey Naboko, Stockholm University, Sweden.
2022 Shape Optimization and Geometrical Spectral Theory, ICMS, Edinburgh, Scotland.
2022 Seminar in the research program "Geometric aspects of nonlinear partial differential equations", Institut Mittag–Leffler, Stockholm, Sweden.
2022 2nd Joint Congress of the AMS, EMS, and SMF, Grenoble, France.
2022 Durham days of analysis and PDE, Durham, United Kingdom.
2022 Mathematical results on many-body quantum systems, Herrsching, Germany.
2021 International Congress of Mathematical Physics, Geneva, Switzerland.

Organisation of scientific meetings and seminars

2024 A minisymposia on functional inequalities and nonlinear PDEs as part of Equadiff 2024 at Karlstad University. Organized with Lorenzo Brasco and Erik Lindgren.
2021 A mini-conference in celebration of Barry Simon's 75th birthday. Organized together with Rupert Frank and Svetlana Jitomirskaya. Virtual event.
2021 The 38th Western states Mathematical Physics Meeting Organised together with Rupert Frank. Virtual event.
2020–2021 Caltech & UCLA joint Analysis seminar. Organised together with Terence Tao, José Ramón Madrid Padilla, and Rachel Greenfeld
2016–2018 The graduate student seminar in mathematics at KTH Organised with Eric Larsson.

Commissions of trust

– Regular reviewer for mathematical journals including: *Archive for rational mechanics and analysis*, *Arkiv för Matematik*, *Canadian Journal of Mathematics*, *Communications in Contemporary Mathematics*, *International Mathematics Research Notices IMRN*, *Journal of Mathematical Physics*, *Journal of Spectral Theory*, *Letters in Mathematical Physics*, *Mathematical Physics, Analysis and Geometry*, *Medeterranean Journal of Mathematics*, *Mathematika*, *Proceedings of the American Mathematical Society*, *Revista Matemática Iberoamericana*, and *The Journal of Geometric Analysis*.
– Active reviewer for AMS Mathematical Reviews and zbMATH.

Other scientific services

2015-2017 Technical editor Acta Mathematica, Institut Mittag–Leffler, Stockholm

Teaching experience

Pedagogical courses completed

FLH399 Basic Communication and Teaching – 3 credits, KTH, Stockholm (2015).

Previous courses

At KTH Royal Institute of Technology, Stockholm (2014–2019)

- Mathematical and Numerical Analysis I., 2014, 2015, and 2016. Course code: SF1668
  10 Swedish credits. TA: exercise sessions and lab assignments (matlab).
  Description: Introductory course in one variable calculus and numerical analysis for bachelors programs in Vehicle Engineering and Simulation Technology.

- Applied Linear Algebra I., 2014. Course code: SF1666
  12 Swedish credits. TA: exercise sessions and lab assignments (matlab).
  Description: Introductory course in linear algebra, vector geometry and numerical methods for bachelors program in Simulation Technology.
- Applied Linear Algebra II., 2014. Course code: SF1667
  12 Swedish credits. TA: exercise sessions, lab assignments (matlab), and group projects.
  Description: Introductory course in linear algebra, vector geometry and numerical methods for bachelors program in Vehicle Engineering including an introduction to basics of programming in matlab.
- Calculus in several variables, 2016 and 2017. Course code: SF1626
  7.5 Swedish credits. TA: exercise sessions, group problem sessions.
  Description: First course in differential and integral calculus for functions of several variables. Joint for several different bachelors programs.
- Calculus in several variables, 2018. Course code: SF1674
  7.5 Swedish credits. TA: exercise sessions, group problem sessions.
  Description: First course in differential and integral calculus for functions of several variables for bachelors program in Engineering Physics.
- Analysis in one variable, 2018. Course code: SF1673
  7.5 Swedish credits. TA: exercise sessions, group problem sessions.
  Description: First course in analysis, differential and integral calculus for functions of one real variable for bachelors program in Engineering Physics.
- Introductory mathematics course, 2018. Course code: SF0003
  1.5 Swedish credits. TA: exercise sessions.
  Description: Two-week introductory course in mathematics for bachelors program in Engineering Physics.

At Chalmers University of Technology & the University of Gothenburg (2021–Present)

- Matematisk Analys, 2022. Course codes: TMV170, MMGD30.
  7.5 Swedish credits. Full course responsibility (lectures, examination, and exercise sessions).
  Description: First course in differential and integral calculus in one real variable for bachelor programs in computer sciences. Approximately 230 registered students.
- Matematisk Analys, 2023. Course codes: TMV170, MVE045, MMGD30.
  7.5 Swedish credits. Full course responsibility (lectures and examination).
  Description: First course in differential and integral calculus in one real variable for bachelor programs in computer sciences and software engineering. Approximately 350 registered students.
- Matematisk Analys, 2024. Course codes: TMV170, MVE045, MMGD30.
  7.5 Swedish credits. Full course responsibility (lectures and examination).
  Description: First course in differential and integral calculus in one real variable for bachelor programs in computer sciences and software engineering. Expected to be 350 registered students.