

## Personal details and date of CV

- Surname: Railo, First names: Jesse Tapio
- ORCID: <https://orcid.org/0000-0001-9226-4190>, Google Scholar: [https://scholar.google.fi/citations?user=4-P\\_eq4AAAAJ&hl=fi](https://scholar.google.fi/citations?user=4-P_eq4AAAAJ&hl=fi).
- Homepage: <https://sites.google.com/view/jesserailo>.
- Language skills: Finnish (native), English (professional), Swedish (basics).
- Date of birth: 12 July 1990.
- Date of CV: 30 August 2024

## Degrees and titles

- 1 April, 2024: Title of Docent (1.4.2024 - 31.3.2029) in Mathematical Foundations of Inverse Problems, School of Engineering Sciences, LUT University.
- 18 December, 2019: Doctor of Philosophy in Mathematics, awarded with distinction, University of Jyväskylä, Finland; advisor: Prof. Mikko Salo.
- 10 June, 2014: Master of Science in Mathematics, University of Tampere, Finland.
- 29 May, 2014: Bachelor of Science in Mathematics (minors: Computer Science, Statistics), University of Tampere, Finland; including a one-year Erasmus exchange period at the University of Sheffield, UK, in 2011–2012 (60 ECTS, Applied Mathematics and Physics).

## Current employment

- 1 September 2024 – 31 August 2028: Associate Professor (tenure track) of Applied Mathematics, Computational Engineering, School of Engineering Sciences, Lappeenranta–Lahti University of Technology LUT, Finland.

## Previous work experience

- 1 September 2023 – 31 August 2024: Associate Professor (non-tenure track), Computational Engineering, School of Engineering Sciences, Lappeenranta–Lahti University of Technology LUT, Finland.
- 1 September 2021 – 31 August 2023: Visiting Research Fellow, Department of Pure Mathematics and Mathematical Statistics, University of Cambridge, UK; host: Prof. Gabriel P. Paternain. Funding source: Finnish Academy of Science and Letters.
- 1 September 2020 – 31 August 2021: Postdoctoral Researcher, Seminar for Applied Mathematics, Department of Mathematics, ETH Zürich, Switzerland; mentor: Prof. Rima Alaifari.
- 1 January – 31 August 2020: Postdoctoral Researcher, Department of Mathematics and Statistics, University of Jyväskylä, Finland; mentor: Prof. Mikko Salo.
- 1 January 2016 – 31 December 2019, break in 2018: Doctoral Researcher, Department of Mathematics and Statistics, University of Jyväskylä, Finland; advisor: Prof. Mikko Salo.
- 1 January – 31 December 2015: Grant Researcher (Doctoral Student), Department of Mathematics and Statistics, University of Jyväskylä, Finland; advisor: Prof. Mikko Salo. Funding source: Faculty of Mathematics and Science, University of Jyväskylä.
- 1 July 2014 – 31 July 2015 (part-time): Research Assistant in Geophysics, Department of Physics / Oulu Mining School, University of Oulu, Finland; supervisor: Prof. Maxim Smirnov.
- 1 June 2013 – 31 May 2014 (part-time): Research Assistant in Atmospheric Remote Sensing, Finnish Meteorological Institute, Helsinki, Finland; supervisor: Prof. Johanna Tamminen.
- 1 July 2012 – 31 December 2013 (part-time): Teaching Assistant in Mathematics, School of Information Sciences, University of Tampere, Finland; supervisor: Dr. Pentti Haukkanen.

## Career breaks

- September - December 2024 (2 months): Half-time parental leave.
- 13 February - 4 March 2024 (3 weeks): Parental leave.
- 8 January - 21 December 2018 (12 months): Non-military service, University of Helsinki.

## Research funding and grants

- 1 January 2025 - 31 December 2027: Project Grant, Emil Aaltonen Foundation, 200 000 EUR. Primary applicant, PI: Jesse Railo; other applicants: Jouni Sampo (LUT University, Finland), Janne Nurminen (University of Jyväskylä, Finland).
- 1 August 2024 - 31 December 2027: Doctoral Education Pilot for Mathematics of Sensing, Imaging and Modelling (DREAM), Ministry of Education and Culture, 25.5 million EUR. Director: Tanja Tarvainen (University of Eastern Finland). A PI at LUT University.
- 6 January - 27 June 2025: ASLA-Fulbright Research Grant for Junior Scholars 2024-2025, Fulbright Finland Foundation, 30 000 USD (cost-shared with LUT University). Primary applicant, PI: Jesse Railo; host: András Vasy (Stanford University, USA).
- 1 January 2025 - 31 December 2026: Homing Grant, Jenny and Antti Wihuri Foundation, 75 000 EUR. Primary applicant, PI: Jesse Railo; other applicant: Shubham R. Jathar (IISER Bhopal, India).
- 1 January 2024 - 31 December 2027: Flagship of Advanced Mathematics for Sensing, Imaging and Modelling (FAME), Research Council of Finland, 8 million EUR. Director: Tanja Tarvainen (University of Eastern Finland). A PI at LUT University.
- 1 September 2021 - 31 August 2023: Foundations' Post Doc Pool Grant, Finnish Academy of Science and Letters, 91 000 EUR. Primary applicant, PI: Jesse Railo; host: Gabriel P. Paternain (University of Cambridge, UK).
- 1 January - 31 December 2015: Doctoral Student Grant, Faculty of Mathematics and Science, University of Jyväskylä, 22 000 EUR. Primary applicant: Jesse Railo; PI: Mikko Salo.

## Research output and interests

Current research output: 14 peer-reviewed original research articles, 5 submitted preprints, 1 computer code package. Research areas:

- Integral geometry for geodesic flows, especially generalized geodesic ray transforms.
- Inverse problems for PDEs, fractional and nonlocal equations.
- Low regularity and partial data questions for inverse problems
- Stability theory, Bayesian inference and reconstruction methods for inverse problems.

## Research supervision and leadership experience

Current and upcoming supervision at LUT University:

- Jouni Sampo, senior researcher, 2025-2028
- Shubham R. Jathar, postdoctoral researcher, 2024-2027
- Antti Kujanpää, postdoctoral researcher, 2024-2026
- Janne Nurminen, postdoctoral researcher, 2025-2027
- Oula Kekäläinen, doctoral student, 2024-2028
- Juho Virpiranta, doctoral student, 2024-2028
- Jarmo Flander, doctoral student, 2025-2028 (M.Sc. supervision, 2024)

## Teaching merits

- Current teaching duties: Principal teacher of 3 undergraduate courses (Optimization; Partial Differential Equations; Euclidean Spaces) at LUT University.

- Past teaching duties 2012–2021 at ETH Zürich, Jyväskylä, Helsinki and Tampere: 7 times postgraduate and 13 times undergraduate courses of which 6 as a lecturer and 13 as a TA.
- I created a postgraduate course *Nonlocal Inverse Problems* at ETH Zürich in 2021 (14 weeks) with new study material of about 150 pages based on multiple research articles and books. The course considered boundary determination, interior uniqueness, stability and partial data for electrical impedance tomography (Calderón problem) as well as analysis of the fractional Calderón problems appearing in the most recent scientific literature.
- I took part to create two Massive Open Online Courses (MOOCs) on inverse problems at Helsinki in 2018 (this project was led by S. Siltanen). In 2019, I introduced two new mathematics courses at Jyväskylä based on these MOOCs. The courses introduce signal and image processing techniques based on regularization and convolutional methods as well as regularization, Fourier analysis and optimization techniques for X-ray computed tomography.

### Awards and honours

- December 2020: Finnish Inverse Prize of the Finnish Inverse Problems Society.

### Other key academic merits

- Future appointment, 6 January – 27 June 2025: Visiting Associate Professor, Department of Mathematics, Stanford University, California, USA.
- Referee for journals: *Inverse Problems* (2x), *SIAM Journal on Mathematical Analysis*, *Journal of Mathematical Analysis and Applications* (2x), *Communications in Contemporary Mathematics*, *Journal of Geometric Analysis* (2x), *Mathematics of Computation*, *International Journal of Computer Mathematics*, *Electronic Research Archive*, *International Mathematics Research Notices*, *Journal of Inverse and Ill-Posed Problems*, *Journal of Fourier Analysis and Applications*, *Bulletin des Sciences Mathématiques*, *Results in Mathematics*.
- Reviewer for *Mathematical Reviews* (MathSciNet) of the American Mathematical Society.
- Membership of the Inverse Problems International Association (IPIA), the Finnish Mathematical Society (SMY) and the Finnish Inverse Problems Society (FIPS).
- Two invited talks at the International Zoom Inverse Problems Seminar (UC Irvine) in September 2022 and May 2023. Invited talk at the Isaac Newton Institute, Cambridge, May 2023. Two invited talks in *Applied Inverse Problems* (AIP), Göttingen, Germany, September 2023. About 20 other research talks in 2019–2023. Most recent invited talks: *International Conference on Elliptic and Parabolic Problems (GAETA 2024)*, Italy, May 2024; *Inverse Problems: Modeling and Simulation (IPMS 2024)*, Malta, May 2024.
- Member of the organizing committee of *Inverse Days*: 2019 in Jyväskylä and 2023 in Lahti.
- Organizer of two minisymposia: 1. *Applied Inverse Problems*, Göttingen, September 2023: *Inverse problems for fractional and nonlocal equations* (with Yi-Hsuan Lin and Mikko Salo). 2. *Finnish Mathematical Days*, Aalto University, January 2024: *Inverse problems* (with Tony Liimatainen).
- A member of the Steering Group of Computational Engineering Department, LUT University, since 26 March 2024.

### Scientific and societal impact

- 11 November 2023: Popular talk *How tomography can be studied via geometry?* at Integraatiofest in Lappeenranta, an annual physics and math students networking event.
- 31 October 2023: Invited talk in high school (Lyseon lukio) in Lappeenranta about university mathematics, research career and inverse problems plus some playing around with matrices.