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## CURRICULUM VITAE

12.1.2022

### PERSONAL INFORMATION

Full name: Tarvainen (born Vilhunen), Tanja Maarit  
Gender, children: Female, married, 1 child (Roni, born 30.11.2006)  
ResearcherID: A-1477-2009  
ORCID: 0000-0002-7919-4033

### DATE AND PLACE OF BIRTH, NATIONALITY, CURRENT RESIDENCE

Date and place of birth: 19.5.1974, Siilinjärvi, Finland  
Citizenship: Finland  
Current residence: Kuopio, Finland

### EDUCATION AND DEGREES AWARDED

2009 Docent: *Optical tomography*, University of Kuopio, Department of Physics, Finland, 1.12.2009  
2006 PhD, "Computational Methods for Light Transport in Diffuse Optical Tomography", Department of Physics, University of Kuopio, Finland, 27.10.2006  
2000 MSc, "Determining the dielectric properties of biological tissues", Department of Applied Physics, University of Kuopio, 6.11.2000  
1993 Matriculation, 5.6.1993, Siilinjärven lukio

### LINGUISTIC SKILLS

Native language: Finnish  
Other language skills: English (fluent), German (moderate), Swedish (moderate)

### CURRENT POSITION

2021– Professor (Computational imaging and modelling), Department of Applied Physics, University of Eastern Finland, Finland  
2021–2026 Visiting Professor, Department of Computer Science, University College London, UK  
2019– Head of the Biomedical Optical Imaging and Ultrasound Laboratory, Department of Applied Physics, University of Eastern Finland, Finland

### PREVIOUS POSITIONS

2021 Vice head of the Department of Applied Physics, University of Eastern Finland, Finland  
2007–2021 Research Associate (part-time 4/2008-4/2021), Department of Computer Science, University College London, UK  
2017–2020 Associate Professor (tenure track), Department of Applied Physics, University of Eastern Finland, Finland  
2016 Senior researcher, Department of Applied Physics, University of Eastern Finland, Finland  
2011–2015 Academy Research Fellow, Department of Applied Physics, University of Eastern Finland, Finland  
2008–2010 Academy postdoctoral researcher, Department of Physics, University of Kuopio, Finland  
2001–2006 Researcher, Department of Physics, University of Kuopio, Finland

## CAREER BREAKS

18.11.2006–30.11.2007 Maternity leave (12 months)

## RESEACRH FUNDING AND GRANTS

2021–2026 ERC CoG, “Quantitative tomography using coupled physics of waves”, 2 000 000 €.  
2018–2025 Academy of Finland, Team leader in the “Centre of Excellence in Inverse Modelling and Imaging”, 118 109 € (2018-2020), 94 700 € (2020-2022)  
2018–2021 Academy of Finland, Consortium PI of the RADDESS Academy Programme project “Nanotheranostics based on light”, 349 472 €  
2017–2021 Jane and Aatos Erkko Foundation, 500 000 € “Quantitative imaging using light and sound”.  
2014–2016 Magnus Ehrnrooth foundation, 60 000 €, “Quantitative photoacoustic tomography”.  
2011–2014 University of Eastern Finland, 270 000 €, strategic funding of the University of Eastern Finland (Innovative Research Initiatives –projects), “Computational methods for quantitative photoacoustic tomography”  
2011–2015 Academy of Finland, 750 000 €, post and research costs of an Academy Research Fellow, “Modelling and reconstruction in three dimensional optical imaging”  
2008–2010 Academy of Finland, 189 000 €, postdoctoral research project, “Modelling approaches to the forward and inverse problem of optical tomography”  
2000– Smaller research and travel grants from various foundations, approximately 40 000 €

## RESEARCH OUTPUT

**Publications** Articles in peer-reviewed international scientific journals: 57  
Articles in refereed scientific edited volumes and conference proceedings: 41  
Book chapters: 3  
Articles in professional journals: 1

**Software** ValoMC - A Monte Carlo software for simulating light transport  
<https://inverselight.github.io/ValoMC/>

**Invention disclosures:** 3

## SUPERVISION OF POSTDOCTORAL FELLOWS, GRADUATE AND UNDERGRADUATE STUDENTS

**Postdocs** Meghdoot Mozumder (2018-), Jarkko Leskinen (2017-), Alekski Leino (2017-2019), Aki Pulkkinen (2012-2018)

**PhD students** Miiika Suhonen “Photoacoustic tomography in a heterogeneous medium”, in progress  
Jonna Kangasniemi “Utilising the radiative transfer equation in optical tomography”, in progress  
Teemu Sahlström “Modelling and image reconstruction in photoacoustic tomography”, in progress  
Eero Koponen “Synthetic schlieren tomography”, in progress  
Niko Hänninen “Image reconstruction and modelling of uncertainties in quantitative photoacoustic tomography”, in progress  
Aksel Kaastrup Rasmussen (Technical University of Denmark, secondary supervisor) “Computational Uncertainty Quantification for Hybrid Inverse Problems”, in progress  
Jenni Tick “Image reconstruction and modelling of uncertainties in photoacoustic tomography”, 2019 (Jenni Tick was awarded with the Finnish Inverse Prize for an excellent PhD thesis completed during 2019)  
Jussi Toivanen “Thermal tomography”, 2016 (Jussi Toivanen’s dissertation was awarded “with distinction”)  
Meghdoot Mozumder “Image reconstruction with error modelling in diffuse optical tomography”, 2015

Ossi Lehtikangas “Approximations and hybrid models for modeling light propagation in biological tissues”, 2014

**MSc students** Suvi Källman (in progress), Miika Suhonen (in progress), Anssi Manninen (in progress), Teemu Sahlström (2019), Antti Mikkonen (2019), Olli Nykänen (2015), Hwan Goh (2014), Jenni Tick (2014), Eppu Manninen (2014), Timothy Dennis (2010), Ossi Lehtikangas (2010)

## TEACHING EXPERIENCE

**Lectures** Optimization, Finite element methods, Modelling II, Scientific presentation in physics

**Short courses** “Photoacoustic imaging” at Ultrasound techniques in medicine -course  
“Computational inverse problems with applications in optical tomography” in International Summer School on Inverse Problems, May 25-29, 2015, Helsinki, Finland

**Exercises** Statistical inverse problems, Mathematical modelling, Finite element methods, Optimization, Estimation theory, Modelling II, Physics A, Physics III

**Laboratory** Project works in physics and in scientific computing  
Physics laboratory works for physics students and bioscience students  
Radiation protection demonstrations for bioscience students, medical students and high school students

## Pedagogical training

2012 Research supervision course, University of Eastern Finland, 2012  
2006 Sample lecture, approved with grade good, University of Kuopio, Finland  
2006 Pedagogics in University Education 1 & 2 (4 credit points), University of Kuopio, Finland  
2005 Basics studies in education (15 credit points), University of Joensuu, Finland

## AWARDS AND HONOURS

### Publications with distinction

1 article selected as a Technical Area Pick for Biomedical Acoustics of *The Journal of the Acoustical Society of America* in 2018  
3 articles selected as the highlights of *Inverse Problems* in 2006, 2010, 2012  
1 article selected as insights of *Inverse Problems* in 2013  
1 article selected into 25<sup>th</sup> Year Anniversary Collection of *Inverse Problems*

### Fellowships

2011–2015 Academy Research Fellow, Academy of Finland, Finland  
2008–2010 Postdoctoral Researcher, Academy of Finland, Finland

### Other

2017 Reviewer of the Year for *Inverse Problems* journal for 2017 (selected by the editorial board)

## OTHER KEY ACADEMIC MERITS

### Examiner of a doctoral dissertation

Bjørn Christian Skov Jensen (Technical University of Denmark, Denmark, 2020)  
Alexander Beigl (University of Vienna, Austria, 2020)  
Prabodh Kumar Pandey (IIT Kanpur, India, 2020)  
Roman Hochuli (University College London, UK, 2016)

### Opponent of a doctoral dissertation

Juuso Ketola (University of Oulu, Finland, 2021)  
Hari Nortunen (Tampere University of Technology, Finland, 2018)

Martti Kalke (University of Helsinki, Finland, 2014)

**Pre-examiner of a doctoral dissertation**

Tiina Näsi (Aalto University School of Science, Finland, 2013)

**Expert evaluator in recruitment**

- 2019 Member of the assessment committee for a tenure track position at the Tampere University, Finland
- 2019 Member of the assessment committee for a researcher position at the Technical University of Denmark, Denmark

**Peer review of funding applications**

- 2017– Austrian Science Fund (2017, 2021)  
National Science Centre Poland (2020)  
H2020-MSCA-IF (2019, 2018)  
The Netherlands Organisation for Health Research and Development (2017)  
Austrian Academy of Sciences (2017)  
Czech Science Foundation (2017)

**Memberships and positions of trust in scientific communities**

- 2010– Member of the board (and vice president 2019–) of the “Finnish Inverse Problems Society”
- 2017–2020 Member of the board of the “Finnish Physical Society”
- 2001– Member of the scientific societies: “Society for Industrial and Applied Mathematics, SIAM”, “SPIE. The International Society for Optics and Photonics”, “Finnish Physical Society”, “Finnish Inverse Problems Society”, “Photonics Finland”, “Finnish Society of Medical Physics and Medical Engineering”

**Memberships in national or international expert, evaluation or steering groups and other expert roles**

- 2020– Collaborator in CUQI - Computational Uncertainty Quantification for Inverse Problems, DTU Compute, Denmark
- 2018– Member of the board of the “Finnish Centre of Excellence in Inverse Modelling and Imaging”, Finland
- 2019 Member of the selection committee for the 2020 SIAG/UQ Early Career Prize, Society for Industrial and Applied Mathematics
- 2017–2020 Member of the Finnish National Committee of International Union for Pure and Applied Physics
- 2016–2018 Member of the “Collaborative Community of Finnish Computational Sciences”, Ministry of Education and Culture, Finland
- 2012–2017 Member of the board of the “Finnish Centre of Excellence in Inverse Problems Research”, Finland
- 2011–2015 Member of the board of the “Inverse Problems Doctoral Program”, Finland
- 2011–2015 Supervisor in the “Finnish Doctoral Program in Computational Sciences”, Finland

**Memberships in editorial committees for scientific and professional publication series and journals**

- 2021– Member of the editorial board of the *Inverse Problems* journal
- 2019–2020 Member of the International Advisory Panel of the *Inverse Problems* journal
- 2019– Member of the editorial board of the *Journal of Imaging*

**Referee for scientific publications**

- 2005– Reviewer for over 200 papers in the following 42 international scientific journals: *Inverse Problems*, *Inverse Problems and Imaging*, *Journal of Inverse and Ill-Posed Problems*, *International Journal for Numerical Methods in Engineering*, *Inverse Problems in Science and Engineering*, *SIAM Journal on Imaging Sciences*, *Journal of Mathematical Imaging and Vision*,

*IEEE Transactions on Medical Imaging, Measurement Science and Technology, Journal of Quantitative Spectroscopy and Radiative Transfer, Biomedical Optics Express, Optics Express, Optics Letters, Journal of the Optical Society of America A, Applied Optics, Journal of Biomedical Optics, Physics in Medicine and Biology, Medical Physics, Journal of Optics, Optical Engineering, Biomedical Physics and Engineering Express, Photoacoustics, Applied Physics Letters, IET Image Processing, IEEE Transactions on Computational Imaging, IEEE Transactions on Magnetics, IEEE Photonics Technology Letters, IEEE Journal of Biomedical and Health Informatics, IEEE Sensors Journal, IEEE Access, International Journal of Thermal Sciences, Journal of Mathematical Analysis and Applications, Communications in Computational Physics, Computational Optimization and Algorithms, Journal of Statistical Distributions and Applications, Journal of Selected Topics in Quantum Electronics, Journal of Biophotonics, Journal of Imaging, Quantitative Imaging in Medicine and Surgery, Journal of Micro/Nanolithography MEMS and MOEMS (JM3), Mechanics of Advanced Materials and Structures, PLOS ONE, Physica Scripta, Chemical Engineering Research and Design, Advances in Mechanical Engineering*

#### **Administrative or working group positions in institutes of higher education and research organisations**

- 2019– Member of the board of the Institute of Photonics, University of Eastern Finland
- 2010– Member of the board of the Department of Applied Physics, University of Eastern Finland
- 2013–2021 Member of the teaching work group of the Department of Applied Physics, University of Eastern Finland
- 2013–2018 Organiser of the Department of Applied Physics Seminar Series on Computational Physics, University of Eastern Finland
- 2014– Founder of the network of female researchers of the Finnish Inverse Problems Society
- 2008– Founder of the network of female researcher of the Department of Applied Physics, University of Eastern Finland

#### **ORGANISING SCIENTIFIC CONFERENCES**

##### **Organising scientific meetings**

- 2023 The Isaac Newton Institute for Mathematical Sciences programme “Rich and nonlinear tomography - a multidisciplinary approach”, Cambridge, UK
- 2019 Summer school “Finnish Summer School on Inverse Problems”, June 3-7, 2019, Helsinki, Finland
- 2019 Workshop “Finnish Workshop on Radiative Transfer”, May 6-7, 2019, Helsinki, Finland
- 2012 Summer school “Summer School on Computational Methods for Inverse Problems in Imaging”, June 11-15, 2012, Kuopio, Finland

##### **Memberships in scientific committees of scientific conferences**

- 2022 Optica Biomedical Optics Congress, April 24-27, 2022, Fort Lauderdale, Florida, U.S.A.
- 2022 SIAM Conference on Uncertainty Quantification, April 12-15, 2022, Atlanta, Georgia, U.S.A.
- 2021 Opto-Acoustic Methods and Applications conference at the European Conferences on Biomedical Optics, June 20-24, 2021, Munich, Germany
- 2020 OSA Biomedical Optics Congress, Optical Tomography and Spectroscopy meeting, April 20-23, 2020, Organised as an all-virtual web conference format due to COVID-19
- 2019 OSA Imaging and Applied Optics Congress, Mathematics in Imaging topical meeting, June 24 – 27, 2019, Munich, Germany
- 2018 Mathematics in Imaging, part of OSA Imaging and Applied Optics Congress, June 25 - 28, 2018, Orlando, Florida, USA

##### **Organising mini-symposia in scientific conferences**

- 2022 Uncertainty Quantification and Diffusion Driven Tomography, together with Kim Knudsen and Tapio Helin, in *SIAM Conference on Imaging Science*, March 21-25, 2022, Virtual conference.

- 2019 Uncertainty quantification in imaging, together with Tapio Helin and Nuutti Hyvönen, in *International Congress on Industrial and Applied Mathematics*, July 15-19, Valencia, Spain
- 2018 Imaging with light and sound, together with Felix Lucka, in *SIAM Conference on Imaging Science*, June 5 -8, 2018, Bologna, Italy
- 2015 Optical Imaging using light: from theory to application, together with Teresa Correia, in *Applied Inverse Problems* conference, May 25 -29, 2015, Helsinki, Finland
- 2013 Tomography Based on the Radiative Transfer Equation, together with Simon Arridge and Arnold D Kim, in *Applied Inverse Problems* conference, July 1-5, 2013, Daejeon, Korea

## INVITED LECTURES

### Invited plenary and keynote lectures

- 2021 “Tomography using light and sound” in *Optics and Photonics Days*, December 1-3, 2021, Turku, Finland
- 2019 “Modelling of errors in photoacoustic tomography” in *CIRM Conference on Mathematical and Numerical Approaches for Multi-Wave Inverse Problems*, April 1-5, 2019, Marseille, France
- 2017 “Bayesian approach to photoacoustic tomography”, in *IMA Conference on Inverse Problems from Theory to Application*, September 19-21, 2017, Cambridge, UK
- 2016 “Bayesian approach to quantitative photoacoustic tomography” in *New trends in Hybrid Ultrasonic Imaging*, March 7-10, 2016, Orléans, France
- 2014 “A Bayesian approach to quantitative photoacoustic tomography” in *Distinguished Lectures on Inverse Problems*, August 4-8, 2014, Helsinki, Finland

### Invited minicourses

- 2015 “Computational inverse problems with applications in optical tomography” in *International Summer School on Inverse Problems*, May 25-29, 2015, Helsinki, Finland

### Invited lectures in international conferences and workshops

- 2021 “Utilising the Radiative Transfer Equation in Optical Imaging” in *Special Semester Tomography Across the Scales Prequel Workshop*, virtual & Linz, Austria, October 11-15, 2021
- 2021 “Photoacoustic tomography”, in *Virtual Symposium on Multimodal Medical Engineering*, Kuopio University Hospital, September 23, 2021
- 2021 “Bayesian approach to quantitative photoacoustic tomography” in *ESI workshop on Tomographic Reconstructions and their Startling Applications*, Virtual workshop of the Erwin Schrödinger International Institute for Mathematics and Physics (ESI), March 15-25, 2021
- 2018 “Bayesian approach to photoacoustic tomography” in *INdAM workshop Reconstruction Methods for Inverse Problems*, arranged by E. Beretta, M. de Hoop, E. Francini, O. Scherzer and A. Aspri, Istituto Nazionale di Alta Matematica, Rome, Italy, May 28 – June 1, 2018
- 2018 “Quantitative photoacoustic tomography” in *Trends in Hybrid Data Tomography*, arranged by K. Knudsen and T. Brander, Technical University of Denmark, Lyngby, Denmark, January 24, 2018
- 2017 “Imaging and uncertainty quantification in photoacoustic tomography” in *Bayesian and Nonlinear Inverse Problems*, arranged by F. Dunker, T. Hohage, E. Mammen, J. Schmidt-Hieber and A. van der Vaart, Leiden, the Netherlands, August 28 – September 1, 2017
- 2017 “Quantitative photoacoustic tomography using transport and diffusion models” in *Quantitative Tomographic Imaging – Radon meets Bell and Maxwell*, arranged by M. Bergounioux, U. Langer and O. Scherzer, Linz, Austria, July 10-14, 2017
- 2017 “Image Reconstruction and Uncertainty Quantification in Photoacoustic Tomography” in *Mathematics in Imaging, OSA Imaging and Applied Optics Congress*, San Francisco, California, USA, June 26-29, 2017
- 2017 “Bayesian approach to quantitative photoacoustic imaging” in *Oberwolfach workshop on Computational Inverse Problems for Partial Differential Equations*, arranged by L. Borcea, T. Hohage and B. Kaltenbacher, Oberwolfach, Germany, May 14-20, 2017

- 2017 “Bayesian Approach to Quantitative Photoacoustic Tomography” in *Optimal Experimental Design and Inverse Problems* workshop arranged by N. Polydorides, The Alan Turing Institute, London, UK, 14-15 March, 2017
- 2016 “Utilising the radiative transfer equation in quantitative photoacoustic tomography” in *Quantitative Photoacoustic Imaging Workshop* organised by B. Cox, London, UK, 2016
- 2016 “Image reconstruction with uncertainty quantification in photoacoustic tomography” in *Inverse Problems in the Alps workshop*, Obergurgl, Austria, March 15-19, 2016
- 2015 “A Bayesian Approach to Quantitative Photoacoustic Tomography” in Workshop on *Quantitative Photoacoustic Imaging* organised by J. Laufer, Berlin, Germany, 2015
- 2014 “Light Models for Quantitative Photoacoustic Tomography” in *Quantitative Photoacoustic Imaging Workshop* organized by B. Cox, London, UK, 2014
- 2013 “Utilising radiative transfer equation in quantitative photoacoustic tomography”, in *MIRAN Workshop on Inverse Transport Problems* organised by O. Dorn, Manchester, UK, 2013
- 2010 “Approximation error approach for compensating for modelling errors in optical tomography”, in *Inverse Transport Theory and Tomography* workshop organised by G. Bal, P. Stefanov and G. Uhlmann, Banff, Canada 2010

#### **Invited lectures in mini-symposia of international conferences**

- 2019 “Image reconstruction and modelling of uncertainties in photoacoustic tomography” in *Recent Advances in Tomographic Imaging* mini-symposium arranged by M. Haltmeier and R. Kowar, International Congress on Industrial and Applied Mathematics, Valencia, Spain, 15-19 July, 2019
- 2019 “Modelling of Uncertainties in Photoacoustic Tomography Using a Bayesian Approach” in *Operator Errors in Inverse Problems and PDEs* mini-symposium arranged by Y. Korolev and C.-B. Schönlieb, Applied Inverse Problems conference, Grenoble, France, 8-12 July 2019
- 2019 “Image Reconstruction and Model Reduction in Quantitative Photoacoustic Tomography” in *Inverse Problems in Elastography and Coupled-physics Imaging* mini-symposium arranged by L. Mindrinos and P. Elbau, Applied Inverse Problems conference, Grenoble, France, 8-12 July 2019
- 2016 “Bayesian Approach to Quantitative Photoacoustic Tomography” in *Inverse Problems* mini-symposium arranged by S. Siltanen, Mathdays, Turku, Finland, 2016
- 2015 “Model reduction in optical imaging using a Bayesian approach” in *Computational learning and model optimization* mini-symposium arranged by C.-B. Schönlieb, M. Chung and J.C. De Los Reyes, International Congress on Industrial and Applied Mathematics, Beijing, China, 2015
- 2015 “Bayesian approach to image reconstruction in quantitative photoacoustic tomography” in *Attenuation and Dispersion in Photoacoustic Imaging* mini-symposium arranged by C. Shi and H. Ammari, International Congress on Industrial and Applied Mathematics, Beijing, China, 2015
- 2015 “Truncated Fourier-series approximation of the time-dependent radiative transfer equation” in *Inverse Transport and Optical Tomography* mini-symposium arranged by M. Machida, Applied Inverse Problems Conference, Helsinki, Finland, 2015
- 2014 “Bayesian Image Reconstruction in Quantitative Photoacoustic Tomography” in *Photoacoustic Tomography* mini-symposium arranged by S.R. Arridge and B. Cox, SIAM Imaging Science Conference, Hong Kong, 2014
- 2013 “Bayesian image reconstruction in quantitative photoacoustic tomography”, in *Inverse Problems with experimental data* mini-symposium arranged by M. Lassas, L. Oksanen, and S. Siltanen, Applied Inverse Problems Conference, Daejeon, South Korea, 2013
- 2009 “Approximation errors in optical tomography”, in *New developments in optical tomography mini-symposium* arranged by S. Arridge and J. Schotland in Applied Inverse Problems Conference in Vienna, Austria, 2009

2008 “Utilising the radiative transfer equation in optical tomography”, in *Inverse and Forward Problems in Radiative Transport* mini-symposium arranged by V. Markel, Progress In Electromagnetics Research Symposium, Cambridge, USA, 2008

**Invited lectures in seminar series**

2020 “Bayesian Approach to Quantitative Photoacoustic Tomography in CUQI seminar, Technical University of Denmark (virtual), 9.12.2020

2016 “Quantitative Photoacoustic Tomography” in Inverse Problems Seminar, University of Helsinki, Finland, 5.10.2016

2015 “Quantitative Photoacoustic Tomography” in Inverse Problems and Imaging seminars, University of Manchester, School of Mathematics, UK 22.10.2015

2014 “A Bayesian Approach to Quantitative Photoacoustic Tomography”, in the group seminar of Biological Physics and Soft Matter Group, Department of Physics, Tampere University of Technology, Finland, 28.10.2014

2011 “Corrections to linear methods for diffuse optical tomography using approximation error modelling” in Department of Mathematics seminar series, University of Auckland, Auckland, New Zealand, 2011

**SOCIETAL IMPACT**

2021 Invited lecture “Laskennallinen kuvantaminen” in *Datahallinnan ja laskennan kehittämissuunnitelman päätösseminaari*, Ministry of Education and Culture, CSC – IT Center for Science, December 13, 2021

2021 Research featured in Tekniikka & Talous magazine 26.8.2021  
<https://www.tekniikkatalous.fi/uutiset/uusi-laaketieteellinen-kuvantamismenetelma-yhdistaa-valon-ja-ultraaanen-ja-sopii-jopa-keskosvauvoille-talta-nayttavat-silla-kuvatut-hiiren-aiivot/d53d9a11-17e7-47ac-9b1e-80d84520b27a>