

Curriculum Vitae Lukas Kapitein

Personal information

Name: Lukas Christiaan Kapitein
Date of birth: September 16, 1978
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Education

2002 M.Sc. degree in Experimental Physics VU University, Amsterdam, NL
2007 Ph.D. degree in Biophysics VU University, Amsterdam, NL
Defence: July 2, 2007 (with highest honors)
Title of thesis: *Dynamics of active and passive microtubule crosslinking proteins*
Promotor: Christoph Schmidt
Co-promotor: Erwin Peterman

Positions

2003 – 2007 Graduate student in Biophysics, VU University Amsterdam, research group *Physics of Complex Systems*
2007 – 2011 Postdoctoral fellow in Neurobiology, Erasmus Medical Center, Department of Neuroscience
2011 – 2015 Assistant Professor, Utrecht University, Department of Biology
2016 – 2018 Associate Professor, Utrecht University, Department of Biology
2018 – present Full Professor of Molecular and Cellular Biophysics, Utrecht University, Department of Biology

Professional training

2005 Physiology Course: modern cell biology using microscopic, biochemical and computational approaches, Marine Biological Laboratory, Woods Hole, MA, USA
2012 EMBO Laboratory Management Course for Group Leaders, Ware, UK
2012 – 2013 Teaching Course, Utrecht University, Utrecht, NL
2016 – 2017 Academic Leadership Program, Utrecht University, Utrecht, NL

Teaching

2011 – present Supervision of literature studies (1-2 per year)
2011 – present Supervision of Bachelor and Master research projects
(8-10 per year, supervision together with PhD student or postdoc)
2011 – present Lecturer and supervisor in the Bachelor course *Molecular Cell Research*
2012 – present Organizer of the yearly Master course *Light Microscopy*
2012 – present Lecturer in the Bachelor course *Advanced Neuroscience*
2013 – 2019 Co-organizer of the Summerschool *Neuronal Circuit Development and Plasticity*
2015 – 2021 Lecturer in the Bachelor course *Cells and Tissues*
2017 – present Program leader of the Master program *Molecular and Cellular Life Sciences*
As program leader, I am responsible for the content and quality of the Master program, and for the student selection procedure (~70 students per year).
2018 – present Initiator and co-organizer of the Bachelor course *Light and Electron Microscopy*
2019 – present Member of the Curriculum Committee for the new Bachelor program *Molecular and Biophysical Life Sciences*

Public outreach

- 2008 – present Various high-school lectures about neuroscience or nanoscience
- 2014 Opening lecture at the Hersenstichting Publieksdag (outreach conference of the Dutch brain foundation), Beatrix theater, Utrecht
- 2015 Public lecture at the University Day 2015 of Utrecht University
- 2015 Museum lectures for 10-12 year old children, University Museum Utrecht
- 2016 Public lectures at the Cultural Sunday *Science in the City*
- 2017 Lecture on biophysics for high school teachers
- 2017 Lecture on biophysics for the Utrecht Physical Society, an association for professionals and laymans interested in a broad perspective on physics
- 2018 Session organizer on Biophysics at Fysica 2018, Utrecht
- 2020 – present Annual lab contribution to the Weekend of Science at Utrecht University

Organization of scientific meetings

- 2015 Member of the program committee, Dutch Biophysics 2015 (~400 participants)
- 2016 Co-chair of the program committee, Dutch Biophysics 2016 (~400 participants)
- 2016 Co-organizer of the Lorentz Workshop on Optogenetics, Leiden, March 2016
- 2024 Initiator and co-organizer, AIBIA conference, Utrecht (AI for bio-oriented Image Analysis, ~250 participants)

Academic service

- 2011 – present Peer reviewer for scientific journals and funding agencies
- 2012 – present Four user committees of the Technology Foundation STW
- 2015 – present >15 PhD thesis committees (8x as co-promotor)
- 2015 Selection committee for the new director of the AMOLF institute, Amsterdam
- 2015 Advice committee on the biophysics profile of the Faculty of Science
- 2016 Advice committee for the new strategic plan for the Faculty of Science
- 2016 Jury member for the Netherlands Institute of Neuroscience 2016 Brain Awards
- 2017 Ad hoc NWO-Veni GO committee (handling an appeal)
- 2017 Evaluation committee for the FOM Projectruimte 2017-II
- 2018 NWO-Veni DO committee, selecting awardees for personal fellowships
- 2018 Jury member for the NWO Vrije Programma's Physics
- 2019 - present Multiple selection committees for new PIs at Utrecht University (>10)
- 2020, 2022 Evaluation committee ERC Consolidator Grants (LS3)
- 2020 – present Community board member of NWO community Physics of Life
- 2022 Project evaluation committee of the EMBO Imaging Center in Heidelberg
- 2023 – present Community board chair of Utrecht Life Science community Image Science

Honors, awards, fellowships

- 2007 Erasmus MC fellowship, Erasmus MC Rotterdam
- 2007 Biannual best thesis award from the Dutch Society for Biophysics and Biomedical Technology (shared with dr. Daniel Koster (TU Delft))
- 2007 Graduated with highest honors (*cum laude*)
- 2007 Dutch personal grant: ALW-VENI (for post-doctoral fellows)
- 2013 Dutch personal grant: ALW-VIDI (for starting group leaders)
- 2013 ERC Starting Grant, Cell and Developmental Biology (LS3)
- 2015 Master course *Light Microscopy 2014* elected as top three Master Course of the Utrecht University Graduate School of Life Sciences
- 2017 Plenary speaker at the ASCB-EMBO Meeting, Philadelphia, USA
- 2018 ERC Consolidator Grant, Cell and Developmental Biology (LS3)
- 2022 Dutch personal grant: ALW-VICI (for established group leaders)
- 2023 Elected as member of the European Molecular Biology Organization (EMBO)

Research interests

- Biophysics (molecular motors, biopolymers, self-assembly, random walks)
- Cell biology (cell morphology and intracellular organization, cytoskeleton)
- Neurobiology (neuronal polarity, neuronal transport, aggregate clearance)
- Optical microscopy (live-cells, super-resolution, optogenetics, smart microscopy)
- Super-resolution pathology (expansion microscopy, neurodegeneration)

Our goal is to understand the mechanisms by which cells establish and maintain their precise shape and intracellular organization. This is important, because cellular form and function are often closely connected and altered morphologies can therefore result in dramatic malfunctioning. We particularly focus on establishing new tools and concepts to understand the mechanisms underlying cellular polarization, polarized transport and shape differentiation, as neurodegenerative and other diseases often correlate with altered morphology and distorted intracellular transport. More recently, we started developing tools to image tissue pathology using expansion microscopy.

Metrics of research output

- Total number of publications: 105
- Total number of citations: 11,505
- h-index: 55
- 8 PhD students have graduated under my supervision
- 5 Personal grants (2x postdoctoral grants, 4x PI grants)

Publications

100+ publications in peer-reviewed journals, including Nature (2x), Science (3x), Cell, Nature X (10x), PNAS (2x), Neuron (10x), Current Biology (11x), Journal of Cell Biology (4x), Biophysical Journal (4x), Journal of Neuroscience (3x), EMBO Journal (3x). Ten key publications:

1. Damstra H.G.J., Passmore J.B., Serweta A.K., Koutlas I., Burute M., Meye F.J., Akhmanova A., Kapitein L.C.
GelMap: intrinsic calibration and deformation mapping for expansion microscopy.
Nature Methods (2023)
2. Jansen K.I., Iwanski M.K., Burute M., Kapitein L.C.
A live-cell marker to visualize the dynamics of stable microtubules throughout the cell cycle.
Journal of Cell Biology (2023)
3. Burute M., Jansen K.I., Mihajlovic M., Vermonden T., Kapitein L.C.
Local changes in microtubule network mobility instruct neuronal polarization and axon specification.
Science Advances (2022)
4. Katrukha E.A., Jurriens D., Salas Pastene D.M., Kapitein L.C.
Quantitative mapping of dense microtubule arrays in mammalian neurons.
Elife (2021)
5. Siemons M.E., Hanemaaijer N.A.K., Kole M.H.P., Kapitein L.C.
Robust adaptive optics for localization microscopy deep in complex tissue.
Nature Communications (2021)
6. Janssen, A.F.J., E.A. Katrukha, W. van Straaten, P. Verlhac, F. Reggiori, and L.C. Kapitein
Probing aggregopathy using chemically-induced protein aggregates.
Nature Communications (2018)
7. Tas, R.P., A. Chazeau, B.M.C. Cloin, M.L.A. Lambers, C.C. Hoogenraad, and L.C. Kapitein
Differentiation between oppositely oriented MTs controls polarized neuronal transport.
Neuron (2017)
8. Van Bergeijk, P., M. Adrian, C.C. Hoogenraad, and L.C. Kapitein
Optogenetic control of organelle transport and positioning.

Nature (2015)

9. Kapitein, L.C., M.A. Schlager, M. Kuijpers, P.S. Wulf, M. van Spronsen, F.C. MacKintosh, and C.C. Hoogenraad
Mixed MTs steer dynein-driven cargo transport into dendrites.
Current Biology (2010)

10. Kapitein, L.C., E.J.G. Peterman, B.H. Kwok, J.H. Kim, T.M. Kapoor, and C.F. Schmidt
The bipolar mitotic kinesin Eg5 moves on both microtubules that it crosslinks
Nature (2005)

Invited presentations to internationally established conferences

100+ invited talks at institutions or conferences, including 5 Gordon Research Conferences, the EMBO Meeting 2016, the FENS Forum 2016, the ASCB|EMBO Meeting 2017 (plenary symposium lecture).
Invited lectures at international conferences and workshops:

- 2015 Gordon Research Conference *Motile and Contractile Systems*, New London, USA
2015 Karlsruhe Days of Optics and Photonics, Karlsruhe, Germany
2015 Quantitative Bioimaging Conference, Delft, The Netherlands
2016 Gordon Research Conference *Photobiology*, Galveston, USA
2016 ICREA International Symposium: *BioNanoVision of Cellular Architecture*, Barcelona, Spain
2016 EMBO Workshop *Non-neuronal Optogenetics*, Heidelberg, Germany
2016 10th FENS Forum of Neuroscience, Copenhagen, Denmark
2016 Gordon Research Conference *Muscle and Molecular Motors*, West Dover, USA
2016 European Microscopy Conference, Lyon, France
2016 EMBO Meeting, Mannheim, Germany
2016 VIB conference: *Advances in Cell Engineering, Imaging and Screening*, Leuven, Belgium
2017 Spring meeting of the German Physical Society, Dresden, Germany
2017 EMBO Workshop *Emerging Concepts of the Neuronal Cytoskeleton*, Puerto Varas, Chile
2017 European Biophysical Meeting (19th IUPAB and 11th EBSA Congress), Edinburgh, UK
2017 EMBO Workshop *Non-neuronal Optogenetics*, EMBL, Heidelberg, Germany
2017 Cell Biology of Neurons and Circuits, HHMI Janelia Research Campus, Ashburn, USA
2017 Plenary Symposium *Cell Biology of Neurons*, ASCB-EMBO Meeting, Philadelphia, USA
2018 German Biochemical Society Spring Meeting on Synthetic Biology, Mosbach, Germany
2018 EMBO-EMBL symposium on Microtubules, Heidelberg, Germany
2018 Gordon Research Conference *Cytoskeletal Motors*, West Dover, USA
2018 Annual Meeting of the Japan Neuroscience Society, Kobe, Japan
2018 Logistics of Neuronal Function, MPI for Brain Research, Frankfurt, Germany
2018 European Cytoskeleton Forum, Prague, Czech Republic
2018 Building the Cell Conference, Paris, France
2018 Labeling and Nanoscopy, Heidelberg, Germany
2019 Focus on Microscopy, London, UK
2019 JCS Conference *Cellular Dynamics: Organelle-Cytoskeleton Interface*, Lisbon, Portugal
2019 Physics of Living Matter 2019, Cambridge, UK
2019 Cell Biology of Neurons and Circuits II, HHMI Janelia Research Campus, Ashburn, USA
2019 EMBO-EMBL symposium *Seeing is Believing*, Heidelberg, Germany
2021 Biophysical Society Meeting, online
2021 Cell Physics, Saarbrücken
2021 Microtubules in Neurons, Frauenchiemsee, Germany
2022 Gordon Research Conference Single Molecule Approaches to Biology, Castelldefels, Spain
2023 EMBO Workshop *Emerging Concepts of the Neuronal Cytoskeleton*, Santa Cruz, Chile
2023 EMBO Workshop *Expansion Microscopy*, EMBL, Heidelberg, Germany
2023 IBRO World Congress of Neuroscience, Granada, Spain
2023 MiFoBio Functional Microscopy for Biology, Presqu'île de Giens, France
2023 Curie Workshop *Optogenetics and magnetogenetics*, Paris, France
2024 CoB Workshop *The Cytoskeletal Road to Neuronal Function*, Buxted Park, UK