

# Curriculum Vitae Lukas Kapitein

## Personal information

Name: Lukas Christiaan Kapitein  
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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 – present Associate Professor, 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  
(2-3 per year, supervision together with PhD student or postdoc)  
2011 – present Lecturer and supervisor in the Bachelor course *Molecular Cell Biology*  
2012 – present Organizer of the yearly Master course *Light Microscopy*  
2012 – present Lecturer in the Bachelor course *Advanced Neuroscience*  
2013 – present Co-organizer of the Summerschool *Neuronal Circuit Development and Plasticity*  
2015 – present 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 (~50 students per year).*  
2018 – present Initiator and co-organizer of the Bachelor course *Light and Electron Microscopy*

## 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

## 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)  
*Dutch Biophysics is the annual 2-day go-to conference for all Dutch biophysicists and cell biologists. It features about 20 parallel sessions and 8 plenary lectures.*
- 2016 Co-organizer of the Lorentz Workshop on Optogenetics, Leiden, March 2016  
*Together with John Kennis, I initiated and organized this one-week international workshop with 40 participants, which featured a great line-up of speakers, including Ben Feringa (Nobel prize 2016), Peter Hegemann (Leibniz prize 2013, Brain prize 2013), Tobias Moser (Leibniz prize 2015), Klaus Hahn, Adam Cohen, etc.*

## Academic service

- 2011 – present Peer reviewer for scientific journals and funding agencies
- 2012 – present Three user committees of the Technology Foundation STW
- 2015 – present >10 PhD thesis committees (6x 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 Search committee for a professor in the Department of Physics
- 2017 Jury member 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
- 2018 Search committee for an assistant professor in the Department of Chemistry

## 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

## Research interests

- Biophysics (molecular motors, biopolymers, self-assembly, random walks)
- Cell biology (cell morphology and intracellular organization, cytoskeleton)
- Neurobiology (neuronal polarity, neuronal transport, autophagy)
- Optical microscopy (single molecules, live-cells, super-resolution, optogenetics)

Our goal is to obtain a physical understanding of 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.

## Summary of research output

- Total number of publications: 55 (average journal impact factor > 10)
- Total number of citations: 2,483 (45 citations per publication)
- h-index: 26
- 6 PhD students have graduated under my supervision
- 4 Personal grants (2x postdoctoral grants, 2x PI grants)
- Invited lectures: 60+ lectures within the last 5 years

## Publications

50+ publications in peer-reviewed journals, including Nature (2x), Science (2x), Cell, Nature X (4x), PNAS (2x), Neuron (9x), Current Biology (10x), Biophysical Journal (4x), Journal of Neuroscience (3x), EMBO Journal (2x), and >10 others. Ten key publications:

1. 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) 96: 1264-1271.
2. Cloin, B.M.C., E. De Zitter, D. Salas, V. Gielen, G.E. Folkers, M. Mikhaylova, M. Bergeler, B. Krajnik, J. Harvey, C.C. Hoogenraad, L. Van Meervelt, P. Dedecker, and L.C. Kapitein  
*Efficient switching of mCherry fluorescence using chemical caging.*  
**Proceedings of the National Academy of Sciences of the USA** (2017) 114: 7013-7018.
3. Adrian, M., W. Nijenhuis, R.I. Hoogstraaten, J. Willems, and L.C. Kapitein  
*A phytochrome-derived photoswitch for intracellular transport.*  
**ACS Synthetic Biology** (2017) 6: 1248-1256.
4. Katrukha, E.A., M. Mikhaylova, H.X. van Brakel, P.M. van Bergen En Henegouwen, A. Akhmanova, C.C. Hoogenraad, and L.C. Kapitein  
*Probing cytoskeletal modulation of passive and active intracellular dynamics using nanobody-functionalized quantum dots.*  
**Nature Communications** (2017) 8: 14772.
5. Van Bergeijk, P., M. Adrian, C.C. Hoogenraad, and L.C. Kapitein  
*Optogenetic control of organelle transport and positioning.*  
**Nature** (2015) 518: 111-114.
6. Mikhaylova, M., B.M. Cloin, K. Finan, R. van den Berg, J. Teeuw, M.M. Kijanka, M. Sokolowski, E.A. Katrukha, M. Maidorn, F. Opazo, S. Moutel, M. Vantard, F. Perez, P.M. van Bergen en Henegouwen, C.C. Hoogenraad, H. Ewers, and L.C. Kapitein  
*Resolving bundled MTs using anti-tubulin nanobodies.*  
**Nature Communications** (2015) 6: 7933.

7. Kapitein, L.C. and C.C. Hoogenraad  
*Building the neuronal MT cytoskeleton.*  
**Neuron** (2015) 87(3): 492-506.
8. 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) 20(4): 290-9.
9. Kapitein, L.C., B.H. Kwok, J.S. Weinger, C.F. Schmidt, T.M. Kapoor, and E.J.G. Peterman  
Microtubule cross-linking triggers the directional motility of kinesin-5  
**Journal of Cell Biology** (2008) 182(3): 421
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) 435(7038): 114

### Invited presentations to internationally established conferences

60+ invited talks at institutions or conferences, including 4 Gordon Research Conferences, the EMBO Meeting 2016, the FENS Forum 2016, the ASCB|EMBO Meeting 2017 (plenary symposium lecture).

- 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 10<sup>th</sup> 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, Chili
- 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 JCS Conference *Cellular Dynamics: Organelle-Cytoskeleton Interface*, Lisbon, Portugal