Anisotropy in cell mechanics

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Publication List

Work presented in this thesis

- Wim Pomp*, **Koen Schakenraad***, Hayri E. Balcıoğlu, Hedde van Hoorn, Erik H.J. Danen, Roeland M.H. Merks, Thomas Schmidt, and Luca Giomi, 'Cytoskeletal Anisotropy Controls Geometry and Forces of Adherent Cells', Physical Review Letters 121, 178101, **2018** (Chapter 2).
- **Koen Schakenraad**, Jeremy Ernst, Wim Pomp, Erik H.J. Danen, Roeland M.H. Merks, Thomas Schmidt, and Luca Giomi, 'Mechanical interplay between cell shape and actin cytoskeleton organization', arXiv:1905.09805, **2019** (Chapter 3).
- **Koen Schakenraad**, Bente H. Bakker, Gaia I. Martorana, Luca Giomi, and Roeland M.H. Merks, 'A hybrid Cellular Potts Model predicts stress fiber orientations and traction forces on micropatterned substrates', *in preparation* (Chapter 4).
- **Koen Schakenraad**, Linda Ravazzano, Niladri Sarkar, Joeri A.J. Wondergem, Roeland M.H. Merks, and Luca Giomi, 'Topotaxis of active Brownian particles', Physical Review E 101, 032602, **2020** (Chapter 5).

Other work

- **Koen Schakenraad***, Andreas S. Biebricher*, Maarten Sebregts, Brian ten Bensel, Erwin J.G. Peterman, Gijs J.L. Wuite, Iddo Heller, Cornelis Storm, and Paul van der Schoot, 'Hyperstretching DNA', Nature Communications 8, 2197, **2017**.
- Ludwig A. Hoffmann, **Koen Schakenraad**, Roeland M.H. Merks, and Luca Giomi, 'Chiral stresses in nematic cell monolayers', Soft Matter 16, 764-774, **2020**.
- Joeri A.J. Wondergem, Maria Mytiliniou, Patrick Witzel, **Koen Schakenraad**, Caspar J. Schmeits, Martijn A. Janse, Franz L. Edel, and Doris Heinrich, 'Cell trajectories reveal environmental topographic structure through jump-distance distributions', *in preparation.*

*These authors contributed equally to this work

- Leonie van Steijn, Joeri A.J. Wondergem, **Koen Schakenraad**, Doris Heinrich, and Roeland M.H. Merks, 'Modeling topotaxis with the Cellular Potts Model', *in preparation.*

Curriculum Vitae

I was born in 1990 in Venray, where I grew up and received my secondary education at Raayland College. I specialized in the natural sciences and got interested in physics. During my final year, I won the third prize in the National Physics Olympiad and an honorable mention at the International Physics Olympiad in Hanoi, Vietnam.

In 2008 I enrolled in the BSc program Applied Physics at Eindhoven University of Technology (TU/e). In 2011 I finished the program cum laude with an experimental thesis on atomic layer deposition, and enrolled in the MSc program Applied Physics at TU/e. As part of my master's program, I went abroad for seven months to perform an experimental internship on laser-plasma wakefield acceleration of electrons at the Lawrence Berkeley National Laboratory in Berkeley, California. During my master's program I got interested in theory and wrote a theoretical thesis on the mechanical properties of DNA under supervision of prof. dr. Kees Storm and prof. dr. Paul van der Schoot. In 2014 I completed the program cum laude, and received an Academic Award from TU/e and the Lorentz prize for theoretical physics from the *Koninklijke Hollandsche Maatschappij der Wetenschappen* for my master's thesis. During these six years I discovered how much I enjoy teaching, and worked as a teaching assistant at TU/e and as a mathematics teacher at *Stichting Studiebegeleiding Leiden*. I was also an active member of study association *S.V.T.N. J.D. van der Waals*, and I participated in national (PION) and international (PLANCKS) physics competitions for student teams, winning the first prize in PION and the second prize in PLANCKS.

In 2015 I was awarded a Leiden/Huygens PhD fellowship and started as a PhD candidate at Leiden University in a joint project between the Soft and Biomechanics group of dr. Luca Giomi and the Mathematical Biology group of prof. dr. Roeland Merks. I studied several anisotropic aspects of cell mechanics, the results of which are presented in this thesis. During my PhD, I supervised three master students and collaborated with colleagues from various theoretical and experimental disciplines. I was actively involved in communicating science by presenting my work at several national and international conferences and workshops, as a teaching assistant and guest lecturer in physics and mathematics courses, and in outreach activities such as the *Avond van Wetenschap & Maatschappij* and the *Klokhuis vragendag*. In 2016 I won the Best Presentation Prize at the Casimir Spring School. Furthermore, I was a member of the Institute council of the Leiden Institute of Physics and the Casimir PhD platform, where I focused on monitoring and improving the general well-being of PhD candidates during their PhD.

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