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Anisotropy in cell mechanics

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Publication List

Work presented in this thesis

- Wim Pomp*, **Koen Schakenraad***, Hayri E. Balcioğlu, 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 Sebrechts, Brian ten Benschel, 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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