

Curriculum Vitae

Dr. Stefan A. Karpitschka

Research Group Leader, Physicist

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Research Interests

- Fluid dynamics — micro and macro scale — wetting, complex fluids, evaporation, lubrication
- Soft matter physics — chemistry to mechanics — elastocapillarity, adhesion, rheology
- Biological physics — cell to culture level — cell motility, biomechanical pattern formation

Education

09/2008 – 12/2012	Dr. rer. nat., Physics (summa cum laude) Max Planck Institute of Colloids and Interfaces, Potsdam, Germany Advisors: Prof. Helmuth Möhwald and Dr. Hans Riegler Thesis: “Dynamics of Liquid Interfaces with Compositional Gradients”
10/2002 – 11/2007	Diploma, Physics (with distinction) University of Bayreuth, Germany Advisors: Prof. J. U. Küppers and Prof. S. Wehner Thesis: “Reaction Hysteresis of the CO Oxidation Reaction on Pd(111) Surfaces”

Research

since 05/2017	Research Group Leader Max Planck Institute for Dynamics and Self-Organization , Germany
03/2016 – 12/2016	Postdoctoral Research Stanford University , USA Advisor: Prof. Manu Prakash
01/2014 – 02/2016	Postdoctoral Research University of Twente , The Netherlands Advisors: Prof. Jacco H. Snoeijer and Prof. Detlef Lohse
01/2013 – 11/2013	Postdoctoral Research Max Planck Institute of Colloids and Interfaces , Germany Advisors: Prof. Helmuth Möhwald and Dr. Hans Riegler
11/2007 – 03/2008	Research Assistant University of Bayreuth , Germany Advisors: Prof. J. U. Küppers and Prof. S. Wehner

Professional Experience

since 2005	Self employed software development & technical consulting Real time imaging solutions, science & database tools
01/2003 – 10/2007	Development of measurement software Chair of Experimental Physics III, University of Bayreuth

Honors & Funding

- **Research group** “Interfaces of Complex Fluids” funded by the Max Planck - University of Twente Center for Complex Fluid Dynamics (since 2017)
- **Isaac Newton Institute**, Cambridge, UK (2013): Invited participant at the program “Mathematical Modeling and Analysis of Complex Fluids and Active Media in Evolving Domains”
- **LAM Research AG**, Austria (2012,2013): Industry funded project “Marangoni Drying”
- **Invited publication** with H.R. Brand (2010), special issue of *Physica D* in honor of S.C. Müller

Publications

Key publication metrics:

- Published articles: 20
- Publications in leading journals (Thomson Reuters):
 - 1 in Nature Communications (Impact factor: 11.47; Rank: 3/57 - Multidisciplinary Sciences)
 - 1 in Proc. Natl. Acad. Sci. USA (Impact factor: 9.67; Rank: 4/57 - Multidisciplinary Sciences)
 - 3 in Physical Review Letters (Impact factor: 7.51; Rank: 6/78 - Physics, Multidisciplinary)
- Total citations: 294 (Google Scholar)
- H-index: 9 (Google scholar)

Peer-reviewed journal publications:

- [20] **Cusp-shaped elastic creases and furrows**
S. Karpitschka, J. Eggers, A. Pandey, and J.H. Snoeijer
Phys. Rev. Lett. (2017), accepted, preprint: arxiv.org/abs/1705.01630
- [19] **Dynamical theory of the inverted cheerios effect**
A. Pandey, S. Karpitschka, L.A. Lubbers, J.H. Weijs, L. Botto, S. Das, B. Andreotti, and J.H. Snoeijer
Soft Matter (2017) DOI: [10.1039/C7SM00690J](https://doi.org/10.1039/C7SM00690J)
- [18] **Marangoni Contraction of Evaporating Sessile Droplets of Binary Mixtures**
S. Karpitschka, F. Liebig, and H. Riegler
Langmuir 33, 4682 – 4687 (2017) DOI: [10.1021/acs.langmuir.7b00740](https://doi.org/10.1021/acs.langmuir.7b00740)
- [17] **Shape of a sessile drop on a flat surface covered with a liquid film**
M. Tress, S. Karpitschka, P. Papadopoulos, J.H. Snoeijer, D. Vollmer, and H.-J. Butt
Soft Matter 13, 3760 – 3767 (2017) DOI: [10.1039/c7sm00437k](https://doi.org/10.1039/c7sm00437k)
- [16] **Lubrication of Soft Viscoelastic Solids**
A. Pandey, S. Karpitschka, C. Venner, and J.H. Snoeijer
J. Fluid Mech., 799, 433 – 447 (2016) DOI: [10.1017/jfm.2016.375](https://doi.org/10.1017/jfm.2016.375)
- [15] **Liquid Drops Attract or Repel by the Inverted Cheerios Effect**
S. Karpitschka, A. Pandey, L.A. Lubbers, J.H. Weijs, L. Botto, S. Das, B. Andreotti, and J.H. Snoeijer
Proc. Natl. Acad. Sci. USA, 113, 7403 – 7407 (2016) DOI: [10.1073/pnas.1601411113](https://doi.org/10.1073/pnas.1601411113)
- [14] **Surface Tension Regularizes the Crack Singularity of Adhesion**
S. Karpitschka, L. van Wijngaarden, and J.H. Snoeijer
Soft Matter, 12, 4463 – 4471 (2016) DOI: [10.1039/C5SM03079J](https://doi.org/10.1039/C5SM03079J)
- [13] **Droplets Move over Viscoelastic Substrates by Surfing a Ridge**
S. Karpitschka, S. Das, M. van Gorcum, H. Perrin, B. Andreotti, and J.H. Snoeijer
Nature Commun., 6, 7891 (2015) DOI: [10.1038/ncomms8891](https://doi.org/10.1038/ncomms8891)
- [12] **The Evaporation Behavior of Sessile Droplets from Aqueous Saline Solutions**
V. Soulié, S. Karpitschka, F. Lequien, P. Prené, T. Zemb, H. Möhwald, and H. Riegler
Phys. Chem. Chem. Phys., 17, 22296 – 22303 (2015) DOI: [10.1039/C5CP02444G](https://doi.org/10.1039/C5CP02444G)
- [11] **Periodic Precipitation Patterns during Coalescence of Reacting Sessile Droplets**
M. Jehannin, S. Charton, S. Karpitschka, T. Zemb, H. Möhwald, and H. Riegler
Langmuir, 31, 11484 – 11490 (2015) DOI: [10.1021/acs.langmuir.5b02482](https://doi.org/10.1021/acs.langmuir.5b02482)

- [10] **Spin Casting of Dilute Solutions: Vertical Composition Profile During Hydrodynamic-Evaporative Film Thinning**
S. Karpitschka, C. Weber, and H. Riegler
Chem. Eng. Sci., 129, 243 – 248 (2015) DOI: 10.1016/j.ces.2015.01.028
- [9] **Travelling Fronts of the CO Oxidation on Pd(111) with Coverage-Dependent Diffusion**
J. Cisternas, S. Karpitschka, and S. Wehner
J. Chem. Phys., 141, 164106 (2014) DOI: 10.1063/1.4898705
- [8] **Coalescence and Noncoalescence of Sessile Drops: Impact of Surface Forces**
S. Karpitschka, C. Hanske, A. Fery, and H. Riegler
Langmuir, 30, 6826 – 6830 (2014) DOI: 10.1021/la500459v
- [7] **Sharp Transition between Coalescence and Non-Coalescence of Sessile Drops**
S. Karpitschka and H. Riegler
J. Fluid Mech. Rapids, 743, R1 (2014) DOI: 10.1017/jfm.2014.73
- [6] **Noncoalescence of Sessile Drops from Different but Miscible Liquids: Hydrodynamic Analysis of the Twin Drop Contour as a Self-Stabilizing Traveling Wave**
S. Karpitschka and H. Riegler
Phys. Rev. Lett., 109, 066103 (2012) DOI: 10.1103/PhysRevLett.109.066103
- [5] **Nonintrusive Optical Visualization of Surface Nanobubbles**
S. Karpitschka, E. Dietrich, J.R.T. Seddon, H.J.W. Zandvliet, D. Lohse, and H. Riegler
Phys. Rev. Lett., 109, 066102 (2012) DOI: 10.1103/PhysRevLett.109.066102
- [4] **Delayed Coalescence of Droplets with Miscible Liquids: Lubrication and Phase Field Theories**
R. Borica, S. Menzel, M. Bestehorn, S. Karpitschka, and H. Riegler
Euro. Phys. J. E, 34, 24 (2011) DOI: 10.1140/epje/i2011-11024-9
- [3] **Quantitative Experimental Study on the Transition between Fast and Delayed Coalescence of Sessile Droplets with Different but Completely Miscible Liquids**
S. Karpitschka and H. Riegler
Langmuir, 26, 11823 – 11829 (2010) DOI: 10.1021/la1007457
- [2] **Stochastic Aspects of Pattern Formation during the Catalytic Oxidation of CO on Pd(111) Surfaces**
S. Wehner, S. Karpitschka, Y. Burkov, D. Schmeisser, J. Küppers, and H.R. Brand
Physica D, 239, 746 – 751 (2010) DOI: 10.1016/j.physd.2009.06.010
- [1] **Reaction Hysteresis of the CO + O → CO₂ Reaction on Palladium(111)**
S. Karpitschka, S. Wehner, and J. Küppers
J. Chem. Phys., 130, 054706 (2009) DOI: 10.1063/1.3072712

Talks & Seminars

Invited seminars & talks:

- 2017 — Industry club workshop on droplet coalescence, Durham University, UK
- 2017 — MPI-DS Advances Seminar, Göttingen, Germany
- 2017 — IUSTI, Université Aix-Marseille, Marseille, France
- 2017 — Max Planck - University of Twente Center Kickoff Meeting, Göttingen, Germany
- 2016 — SFB1194 Kickoff Meeting, Darmstadt, Germany
- 2015 — Lorentz Center Workshop “Capillarity of Soft Interfaces”, Leiden, The Netherlands
- 2015 — University of Münster (AG Prof. U. Thiele), Zaferna Workshop
- 2015 — Bioengineering Department, Stanford University, USA
- 2015 — Max Planck Institute for Dynamics and Self-Organization, Göttingen, Germany
- 2014 — University of Münster (AG Prof. U. Thiele), Zaferna Workshop
- 2013 — Isaac Newton Institute Workshop, “Complex Fluids in Evolving Domains”, Leeds, UK
- 2013 — Universität der Bundeswehr, Munich, Germany
- 2012 — Nanobubbles and Micropancakes, l'École de Physique des Houches, Les Houches, France
- 2011 — Chemical Engineering Department, Technion, Haifa, Israel

Selected conference contributions:

- 2016 — *APS March Meeting*, Baltimore, USA
- 2015 — *Fluid & Elasticity*, Biarritz, France
- 2014 — *APS DFD Meeting*, San Francisco, USA
- 2014 — *Flow14*, Enschede, The Netherlands
- 2013 — *Droplets 2013*, Marseille, France
- 2012 — *6th Conference of the International Marangoni Association*, Haifa, Israel
- 2011 — *FluidDTU Summerschool*, Krogerup, Denmark
- 2010 — *Lorentz Center Workshop “Capillary Shaping of Solutes”*, Leiden, The Netherlands
- 2010 — *5th Conference of the International Marangoni Association*, Florence, Italy
- 2010 — *24th Conference of the European Colloid and Interface Society*, Prag, Czech Republic
- 2008 — *DPG Spring Meeting*, Berlin, Germany

Teaching

- since **2011**, mentoring & (co-)advising of ~10 PhD, Master, and Bachelor Students
- **2015**, University of Twente — Teaching assistant & step-in lectures, Master Course *Fluid & Elasticity*, Instructor: Prof. Jacco Snoeijer
- **2014**, University of Twente — Teaching assistant, Bachelor Course *Experimental Techniques in Physics of Fluids*, Instructor: Prof. Michel Versluis
- **2009 & 2010**, University of Potsdam — Teaching assistant, Physical Chemistry III (*Spectroscopy & Crystallography*), Instructor: Prof. Helmuth Möhwald

Service

- Organization — Member of the organizing committee, Droplets 2015 conference, University of Twente, Enschede, The Netherlands
- Organization — Summerschool of the Interfaces Department, Max Planck Institute of Colloids and Interfaces, 2009, Albufeira, Portugal
- Peer-review — Refereeing for *Proceedings of the Royal Society A*, *Journal of Fluid Mechanics*, *Physics of Fluids*, *Langmuir*, *Journal of Physical Chemistry*, *Journal of Polymer Science B*
- Outreach — Numerous lab demonstrations for a wide variety of audiences
- Outreach — Max Planck Institute of Colloids and Interfaces, 2009, Experiments for Children

Media coverage

- **Sep 2016** — *Physics World*, *Physics at the breakfast table*, Karpitschka et al., *Proc. Natl. Acad. Sci. USA* 113, 7403 (2016)
- **Jul 2016** — *New York Times*, *‘Inverted Cheerios Effect’ Returns Physics to the Breakfast Table*, Karpitschka et al., *Proc. Natl. Acad. Sci. USA* 113, 7403 (2016)
- **Jun 2016** — *The Australian*, Karpitschka et al., *Proc. Natl. Acad. Sci. USA* 113, 7403 (2016)
- **Jun 2016** — *Phys.org* and about 30 other news outlets, *How scientists inverted the cheerios effect*, Karpitschka et al., *Proc. Natl. Acad. Sci. USA* 113, 7403 (2016)
- **Aug 2015** — *Science Daily* and several other news outlets, *Surfing droplets: Movement of droplets on soft surfaces*, Karpitschka et al., *Nature Commun.* 6, 7891 (2015)
- **Aug 2015** — *Independence News*, *Surfing droplets in Nature Communications*, Karpitschka et al., *Nature Commun.* 6, 7891 (2015)
- **Sep 2012** — *Nature Nanotechnology*, *News & Views*, *Nanobubbles: Imaged with a light touch*, Karpitschka et al., *Phys. Rev. Lett.* 109, 066102 (2012)