

Detlef Lohse: Curriculum Vitae

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Education

- Nov. 1986: Vordiplom in Physics, University of Kiel (“excellent”)
- Oct. 1989: Diplom in Physics, University of Bonn (“excellent”); subject of the Diploma thesis done at the Kernforschungsanlage Jülich: “Pion-Pion interaction”
- May 1992: PhD thesis at the University of Marburg with Prof. Siegfried Grossmann on “Fully developed turbulence” (“summa cum laude”)
- May 1997: “Habilitation” in Theoretical Physics at the University of Marburg; subject of thesis: “Sonoluminescence: A hydrodynamic approach”; subject of habilitation talk: “Biological motors and Brownian machines”; title “Privatdozent” awarded

Professional Experience

- May 1992 – Sep. 1993: Research Assistant in the Physics Department at Marburg University (Germany), working with Prof. Siegfried Grossmann
- Sep. 1993 – Oct. 1995: Postdoctoral Research Fellow at the James Franck Institute at the University of Chicago, working with Prof. Leo Kadanoff
- Oct. 1995 – Feb. 1998: Research Assistant in the Physics Department at Marburg University, Germany
- Feb. 1998 – June 1998: Heisenberg Fellow of the Deutsche Forschungsgemeinschaft (DFG) at the Ludwig-Maximilians University Munich (Prof. Herbert Wagner), Germany
- From July 1998 on: Chair of Physics of Fluids, at the Department of Applied Physics, University of Twente, Enschede, the Netherlands

Major Prizes and Honors

- Fluid Dynamics Prize of the American Physical Society, Division of Fluid Dynamics (DFD) (2017)
- Member of the National Academy of Engineering (NAE) of the United States of America (elected 2017)
- European Research Council (ERC) Advanced Grant on “Diffusive droplet dynamics in liquid systems” (2017)
- Member of the Netherlands Academy of Technology and Innovation (AcTI, elected 2017)
- Twente Max-Planck-Center for Complex Fluid Dynamics (2016-2025)
- Appointment as Honorary Chair of Fluid Mechanics and Engineering at Tsinghua University, Beijing/China (2016-2020)
- Member of the Max Planck Society and External Member of the Max-Planck Institute for Dynamics and Self Organization in Göttingen (2015)
- NWO Zwaartekracht: Dutch Center for Multiscale Catalytic Energy Conversion (2014-2024, with Bert Weckhysen, Alfons van Blaaderen (Utrecht), Hans Kuipers, Rutger van Santen (Eindhoven), and Albert van den Berg (Twente))
- George K. Batchelor Prize (Fluid Dynamics Prize) of the International Union of Theoretical and Applied Mechanics (IUTAM) and of Journal of Fluid Mechanics/Cambridge University Press (2012)
- AkzoNobel Science Award (2012)
- Member of the Koninklijke Hollandsche Maatschappij der Wetenschappen (2012)
- Physica-Prize of the Dutch Physics Society (NNV) (2011)
- European Research Council (ERC) Advanced Grant on “Physics of Boiling” (2010)
- Knighted by the Dutch Queen: Ridder in de Orde van de Nederlandse Leeuw (April 2010)
- Simon-Stevin-Meesterschap Prize 2009, awarded by STW
- Spinoza Prize 2005, awarded by NWO
- Member of the Royal Dutch Academy of Science (Koninklijke Nederlandse Akademie van Wetenschappen KNAW) (elected April 2005).
- Honored through appointment as “Universiteitshoogleraar” at the University of Twente.
- Fellow of the Institute of Physics, IOP (elected in Aug. 2004).
- Fellow of the American Physical Society, Division of Fluid Dynamics (elected in Sep. 2002): “For his decisive role in unraveling the mystery of single-bubble sonoluminescence and his ingenuity in developing scaling arguments for turbulent thermal convection.”
- Member of the German Academy of Sciences “Leopoldina” (elected in April 2002).
- Heinz Maier-Leibnitz-Preis 1997, awarded through the German minister of Science, Dr. J. Rüttgers, and the President of the Deutsche Forschungsgemeinschaft, Prof. W. Frühwald, with the German President, Dr. R. Herzog, being present.
- Heisenberg Fellowship awarded (1997, Deutsche Forschungsgemeinschaft DFG).

Further Signs of Recognition

- Honorary Professor of Northwestern Polytechnical University in Xi'an, China (October 2017).
- Stewartson Memorial Lecture at the British Applied Mathematics Colloquium, Oxford, April 2016.
- Saint-Gobain Chair at ESPCI-Paris (January 2016).
- Reiss Memorial Lectures 2015 at Northwestern University, Evanston, USA.
- Baetjer Colloquium Lectureship 2013, University of Princeton, Department of Mechanical and Aerospace Engineering.
- Wim Nieuwpoort Award for Scientific Computing (2012).
- "Excellent Referee" Award of Physical Review Letters (2009).
- G. K. Batchelor Lectures at the University of Cambridge, UK (May 2005).
- Visiting Professor at the Ecole Normale Supérieure de Lyon (March – April 2005).
- Member of the Studienstiftung des Deutschen Volkes since 1985; Member of the Selection Committee since 1990.

Present Interests of Research

- Fully developed turbulence and in particular thermally driven turbulence
- Two-phase and bubbly flow
- Micro- and nanofluidics
- Inkjet printing
- Surface nanobubbles and nanodroplets, colloidal science
- Bubble dynamics and sonoluminescence, cavitation
- Granular matter
- Acoustics and ultrasound diagnostics

Publications

About 500 publications in refereed scientific journals, including 10 Nature/Science papers, 75 Physical Review Letters, 85 Journal of Fluid Mechanics, 60 Physics of Fluids/Phys. Rev. Fluids, 10 PNAS, 50 Langmuir/Soft Matter/ACS Nano, 3 Reviews of Modern Physics, 2 Annual Reviews of Fluid Mechanics, and 1 Physics Today Cover article.

The core paper of Lohse's habilitation thesis, "Phase Diagrams for Sonoluminescing Bubbles", Phys. Fluids 8, 2808 (1996), got selected as one of the five most significant papers in Phys. Fluids ever (American Institute of Physics (AIP), 75th anniversary, February 2006, http://www.aip.org/anniversary/pubs_research.html#pof). – His paper "Scaling in thermal convection: a unifying theory" (J. Fluid Mech. 407, 27-56 (2000), with S. Grossmann) is the third but most cited JFM paper in the period since 2000.

Both popular media (including the New York Times, the Washington Post, BBC, National Geographic) and scientific media (including Science, Nature, Nature Physics, Physics Today, Physics World, Physics News Update, and Science News) have reported on various of Lohse's publications; for more details, we refer to a section at the end of the publication list.

“Gallery of Fluid Motion”

Winning entries at the “Gallery of Fluid Motion” at the American Physical Society Meetings (Division of Fluid Dynamics):

- San Francisco, USA, Nov. 2014: “Laser impact on a drop” (van Dyke Prize)
- San Diego, USA, Nov. 2012: “Explosive boiling” (van Dyke Prize)
- Long Beach, USA, Nov. 2010: “Non-axisymmetric impact creates pineapple shaped cavity” (van Dyke Prize).
- Long Beach, USA, Nov. 2010: “Avalanche of particles in evaporating droplets”.
- Minneapolis, USA, Nov. 2009: “Collapse of non-axisymmetric cavities”.
- Tampa, USA, Nov. 2006: “Leaping shampoo”.
- Seattle, USA, Nov. 2004: “Cavitating bubbles on patterned surfaces”.
- Dallas, USA, Nov. 2002: “Voids, Jets, and Faraday”.
- San Diego, USA, Nov. 2001: “Granular eruptions: Void collapse and jet formation”.
- Washington, USA, Nov. 2000: “On the sound of snapping shrimp”.

PhD students & Postdocs

Up to now 75 PhD students graduated under Lohse’s (co-)supervision and about 30 are presently working on their theses. More than 30 former PoF students and Postdocs hold professorships all over the world.

Various of these PhD students and of the Physics of Fluids Master students received national and international prizes for their theses:

- Richard Stevens: ERCOFTAC da Vinci Award for best PhD thesis in Fluid Dynamics in Europe (2011); Overijssel PhD Award (2012); EUROTHERM Young Scientist Prize (2012); DSM Science & Technology Award (2012); Shell-Master-Thesis Prize in Physics (2009),...
- Roeland van der Veen: Shell-Master-Thesis Prize in Physics (2012).
- Maurice Hendrix: Shell-Master-Thesis Prize in Physics (2013).
- Hanneke Gelderblom: FOM Prize for the best PhD thesis in Physics (2014); Charles Hoogendoorn Award for the best PhD thesis in Fluid Dynamics (2014).
- Sander Huisman: Charles Hoogendoorn Award (2016).
- Martin Klein Schaarsberg: Shell-Master-Thesis Prize in Physics (2015).
- Rodolfo Ostilla Monico: Finalist ERCOFTAC da Vinci Award (2015).
- Alvaro Moreno Soto: Euromech Young Scientist Award (2016).
- Xiaojue Zhu: Prize for the best PhD thesis of a Chinese PhD student outside China (2018).
- Varghese Mathai: Best Research Prize by EU-COST Action on “Flowing matter” (2018).
- Vamsi Spandan: George Carrier Fellowship in Applied Mathematics at Harvard (2018).

Editorial Boards

- Editor and Member of the Editorial Board of Journal of Fluid Mechanics 2007-... (Cambridge University Press)
- Member of the Editorial Board of Annual Reviews of Fluid Mechanics 2008, 2014, 2016-2020
- Editor and Member of the Editorial Board of Physica D 2003-2015 (Elsevier)
- Editor and Member of the Editorial Board of Nonlinearity 2002-2015 (IOP)
- Member of the Editorial Board of Physical Review E 2003-2008 (American Physical Society)
- Member of the Editorial Board of Journal of Turbulence 2003-... (IOP)
- Editor and Member of the Editorial Board of Journal of Statistical Mechanics: Theory and Experiment (JSTAT) 2003-... (IOP)
- Editor and Member of the Editorial Board of European Physical Journal B 2004-2007 (Springer)
- Kurator (Editorial Board Member) for Physik Journal 2011-2016 (Springer)
- Editorial Board Member for Zeitschrift für Naturforschung A 2015-... (de Gruyter)
- Occasional Editor for the Proceedings of the National Academy of Sciences of the United States of America (PNAS) 2015-...

International Scientific Boards

- Elected “Member at Large” of the APS – Division of Fluid Dynamics (DFD) Executive Board (2011-2014, 2015-2019)
- Vice-Chair and Chair of the selection committee for the APS-DFD Fluid Dynamics Prize (2018-2020)
- Chairman of the IUTAM Fluid Mechanics Panel (2016-2020)
- Member of the Excellence Commission and of the Committee of Experts for the Excellence Strategy of the German Science Foundation (DFG) (2016-2020)
- Member of the APS Selection Committee for the Leading Editor in Chief of Physical Review Letters (2013)
- Chairman of the APS Selection Committee for the Leading Editor in Chief of Physical Review
Fluids (2016-2017)
- Elected Member of the Euromech Council (2004-2010)
- Member (2003-2009) and Chairman (2009-2017) of the Euromech-Board for the “Euromech Turbulence Conference”
- Member of the Euromech Fluid Dynamics Prize committee (2006-2013)
- Member (2005-2007) and Chairman (2007) of the APS “Publications and Media Committee”, Division of Fluid Dynamics (DFD)
- Member of the APS-DFD “Fluid-Dynamics Prize committee” (2009-2010)
- Member of the Francois Frenkiel Award Committee of APS-DFD (2003-2005)

National Scientific Boards

- Member of the Board of FOM (2003-2014) and of the Executive Board of FOM (2007-2014), Vice-Chair of FOM from 2012 on.
- Chairman of the Selection Committee for the new Chairman of the Executive Board of FOM (2008-2009).
- Chairman of the Selection Committees for the new Director of the Differ Institute (2011) and of the Amolf Institute (2013)
- Member of the KNAW Domeinjury for the selection of new KNAW members (2012 - ...)
- Chairman of the FOM group on Fluid Dynamics (2002-2008) and Member of the FOM steering group on Phenomenological Physics (2002-2007).
- Programme Director for the FOM programs on
 - Physics of granular matter (2003-2015)
 - Contact line control during wetting and dewetting (Industrial Partnership Programme (IPP), 2009-2015)
 - Towards ultimate turbulence (2013-2019)
 - Fundamental fluid dynamics challenges of extreme ultraviolet lithography (IPP, 2013-2019)
 - Fundamental fluid dynamics challenges in inkjet printing (IPP, 2016-2022)
- Member of the Programme Commission of the FOM program on “Dispersed Multiphase Flow” (1999-2009).
- Chairman of the NWO-VICI-grant panel (2006).
- Member of the Board of the Dutch Physical Society (NNV, 2002-2005)
- Member of the Scientific Advisory Board of the Lorentz-Center, Leiden (2002-2008)
- Chairman of the Advisory Board for the Lorentz-Center in Leiden (2015 -...)
- Department Chair of the Physics Department within the Faculty for Science and Technology (2003-2006)
- Local Director of the Burgers Center for Fluid Dynamics (2004-...)

Meeting Organization and Service to the Community

(Selection)

- Initiator and Director of the Max-Planck Center “Complex Fluid Dynamics Fluid Dynamics of Complexity” between Twente and the Max-Planck Institutes in Göttingen and Mainz (2016-2012).
- Coordinator of EU Research Network on “Nonideal Turbulence” (7 nodes), 1999-2005
- Co-Organizer of the Conference ‘Droplets 2015’ in Twente (220 participants)
- Co-Organizer of the Conference ‘Flow14’ in Twente (450 participants)
- Co-Organizer of the IUTAM Colloquium on ‘Dispersed multiphase flow’ in Mexico in 2015
- Organizer of the APS-DFD Minisymposium on ‘Surface Nanobubbles’ in Pittsburg in 2013 and a FOM-Focussession on ‘Vapor nanobubbles’ in Veldhoven in 2014
- Organization of FOM-meetings and Heraeus Conferences on “Nonlinear Science” and on “Granular Matter”, in 2000, 2001, 2002, 2003, 2005, 2007, 2009, 2011

- Organization of the 443th Euromech colloquium on “High Rayleigh Number Thermal Convection” in Leiden, June 10-20, 2003, the 480th Euromech Colloquium (Sep. 4-8, 2006, Trieste) , and the 520th Euromech Colloquium, Jan. 24-29, 2010, in Les Houches, both on the same subject
- Organization of the Les Houches Workshop on “Surface Nanobubbles”, February 12-17, 2012, Les Houches (France)
- Organization of the Euromech Colloquia and Lorentz-Center workshops on “Hydrodynamics of bubbly flows” (June 6-16, 2005), on “Micro- and nanofluidics” (June 9-20, 2008), on “Contact-line instabilities”, (January 3-8, 2010), all in Leiden (Netherlands)
- Steering committee and Programme Commission for the general FOM Conference (> 1600 participants) in Veldhoven (2007 - 2008)
- Summer school “Physics of Fluids” for gifted undergraduates (Studienstiftung des Deutschen Volkes), La Villa, Italy, August 2001 (with Prof. Bruno Eckhardt)
- 4U Summer school “Complex Motion in Fluids” (Cambridge, Copenhagen, Paris, Twente), 2015 -
...

Colloquia and invited lectures at conferences

About 500 talks at scientific meetings and seminars, including about 100 general colloquia talks in Physics, Mechanical Engineering, Chemical Engineering, Chemistry, and Mathematics Departments. Highlights of keynote lectures at major international conferences include

- On the sound of snapping shrimp,
plenary lecture at the Dynamic Days Europe 2001 in Dresden, June 2001.
- Bubble puzzles,
plenary lecture at the Meeting of the Society for Industrial and Applied Mathematics (SIAM) in Snowbird, Utah, May 2003.
- Voids, jets, and clusters in granular dynamics,
plenary lecture at the 5th EUROMECH Fluid Mechanics Conference (EFMC2003), Toulouse, August 2003.
- Sonoluminescence and bubble puzzles,
plenary lecture at the Cavitation 2003 conference (CAV2003) in Osaka, Japan, November 2003.
- Bubbly turbulence,
plenary lecture at the 5th International Conference for Multiphase Flow (ICFM5) in Yokohama, Japan, June 2004.
- Impact: Void collapse and jet formation,
Batchelor-Lecture at the University of Cambridge, UK, May 2005
- Bubble puzzles,
invited plenary lecture at the annual meeting of the American Physical Society (APS), Division of Fluid Dynamics (DFD), Tallahassee, Florida, November 2006.
- Impact on soft granular matter: the role of air,
invited lecture at Statphys 23, Genova, Italy, July 2007.
- Bubbles in micro- and nano-fluidics,
Fluid Mechanics sectional lecture at the ICTAM 2008 Meeting in Adelaide, Australia, August 2008.
- Challenges in inkjet printing,
plenary lecture at the IMNA in Minneapolis, November 2009.

- Supersonic jets in air and water, Prize Lecture for the Physica-Prize (Dutch Physical Society), Amsterdam, April 2011.
- Turbulent Rayleigh-Bénard and Taylor-Couette turbulence, G. K. Batchelor-Prize lecture at the ICTAM Meeting in Beijing, August 2012.
- Stability of surface nanobubbles, Opening Plenary Lecture at the 6th Biennial Australian Colloid and Interface Symposium, Noosa, Queensland, Australia, February 2013.
- Floating on air, Baetjer Colloquium Lectureship 2013, University of Princeton, Department of Mechanical and Aerospace Engineering, March 2013.
- Floating on air, Plenary talk at the conference Condensed Matter in Paris (CMD 25 and JMC 14, August 2014).
- Surface nanobubbles and nanodroplets: the big picture, & The phase space of turbulent Taylor-Couette flow, Reiss Memorial Lectures (Part I and Part II) at the McCormick School of Engineering, North Western University, Evanston, USA (May 2015)
- Surface nanobubbles, Keynote Lecture at the 9th International Symposium on Cavitation (CAV2015) in Lausanne, Switzerland (December 2015).
- Surface nanobubbles and nanodroplets: The big picture, Stewartson Memorial Lecture at the British Applied Mathematics Colloquium, Oxford, UK (April 2016).
- Surface nanobubbles and nanodroplets, Keynote lecture at the International Conference on Multiphase Flow (ICMF) in Florence, Italy (May 2016).
- Nucleating bubbles, keynote lecture at the Gordon Conference on Micro & Nanoscale Phase Change Heat Transfer in Galveston, TX, USA (January 2017).
- Surface nanodroplets, Keynote Lecture at the Conference “Flow 17” in Paris (June 2017).
- Turbulent Taylor-Couette flow, Keynote Lecture at the Tenth International Symposium on Turbulence and Shear Flow Phenomena (TSFP10) in Chicago, USA (July 2017).
- Diffusive droplet dynamics in multicomponent liquid systems, Keynote Lecture at the Gordon Conference on “Soft Matter in and out Equilibrium”, Colby-Sawyer College, New London, NH, USA (August 2017).
- Rayleigh-Bénard and Taylor-Couette turbulence, Fluid Dynamics Prize Lecture at the 70th Annual Meeting of the APS Division of Fluid Dynamics in Denver, USA (November 2017).

Industrial Cooperations

(Selection)

- Océ, Venlo (Netherlands), on “Ink-jet printing” (ongoing project).
- ASML (Veldhoven) on “Wetting and contact line instabilities” (ongoing project).
- Schering AG, Berlin, and Bracco, Geneva, on “Acoustical diagnostics” and “Ultrasound contrast agents”.
- Bosch AG, Stuttgart, on “Bubbles in brake systems” and on “Shockwaves and jets in pipes”.
- Consortium of Dutch companies (Shell, Corus, Akzo Nobel, DSM) on “Two phase flow with free surfaces” (ongoing project).
- Medspray (Enschede) on “Spray formation and emulsification” (ongoing project).
- Philips Medical System (Eindhoven), on “Bubbles for ultrasound and therapy”.
- LAM (Austria) on “Drying droplets”.
- M2I and TNO on “Cleaning with surface nanobubbles”.
- TNO/Holst on “Freezing droplets” (ongoing project).

Patents and patent applications

- Device and method for creating a microfluidic jet and uses thereof, # EP 10163670 (2010), with Rory Dijkink, Andrea Prosperetti, and Chao Sun.
- Apparatus and method for mass producing a monodisperse microbubble agent, # PCT/NL2012/050179 (2012), with Elena de Castro Hernandez, José Gordillo, Wim van Hoeve, and Michel Versluis.
- Method and apparatus for in-air production of single droplets, compound droplets, and shape-controlled (compound) particles or fibers, EP 160002EP00 (2016), with C. W. Visser, T. Kamperman, and M. Karperien.

Startup companies

The following startup companies emerged out of the Physics of Fluids group:

- ACFD Consultancy (Analytical and Computational Fluid Dynamics), Roger Jeurissen, 2010.
- Tide Microfluidics (Creation of monodisperse microbubbles), Wim van Hoeve, 2011.
- Bubclean (Controlled cleaning with microbubbles), Bram Verhaagen and David Fernandez Rivas, 2013.

Teaching

- 1984 – 93: Teaching Assistant in Theoretical Physics (“Mechanics”, “Electrodynamics”, “Quantum Mechanics”, “Statistical Physics”)
- 1990 – 93, 1995 – 97: Teaching in Experimental Labs
- 1990 – 93, 1995 – 97: Course Lectures on “Mechanics”, “Electrodynamics”, and “Statistical Physics”
- 1995 – 2018: Special Lectures on “Phase Transitions and Renormalization”, “Partial Differential Equations in Physics”, “Bubbles”, “Stochastic Processes”, “Turbulence”, and “Granular Flow”, “Advanced Fluid Mechanics”, including several courses for the Burgers Center
- 1999 – 2002, 2006 – 2007: Course Lecture “Physics of Fluids”
- 2002 – 2005: Course Lecture “Dynamics”

Languages

- German: native speaker
- English: fluent
- Dutch: fluent
- Latin: “Latinum”
- Ancient Greek: “Graecum”
- Italian: basic knowledge

Personal Information

- Date of birth: September 15th, 1963
- Place of birth: Hamburg, Germany
- Citizenship: German

Summary of key numbers (February 2018):

- Researcher ID: B-4915-2013
- Number of published refereed papers: 500
- Hirsch-index (Google Scholar): $H = 81$
- Hirsch-index (Web of Science): $H = 66$
- m -index = $H/(\# \text{ of years after PhD}) = 3.2$ respective 2.6
- Citations in 2016: 3100 (Google Scholar) respective 2260 (Web of Science)
- Total citations: ≈ 24500 respective ≈ 16500
- Average citations/article: 34 (Web of Science)
- MNCS-citation index 2004-2014: 2.73 (1.0 is world average)
- i_{10} -index 334 (296 since 2013)
- Number of (present) PhD students in Lohse’s PoF group: 40
- Number of finished PhD theses supervised: 75
- Cumulative number of postdocs (1999-2016): 55