

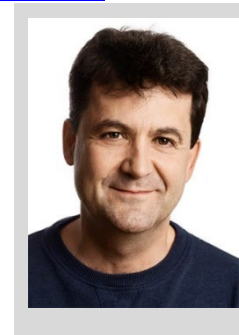
14 April 2022

CURRICULUM VITAE, Henrik Bruus

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PERSONAL INFORMATION

Henrik Bruus (born 5 April 1963), professor of theoretical physics, Department of Physics, Technical University of Denmark, Kgs Lyngby, Denmark. Nationality: Danish. Languages: Danish (mother tongue), English & French (fluent) Married to Kirsten Bruus, son Sebastian
Web site: www.staff.dtu.dk/bruus E-mail: bruus@fysik.dtu.dk
ORCID [0000-0001-5827-2939](https://orcid.org/0000-0001-5827-2939), ResearcherID [C-4475-2008](https://orcid.org/C-4475-2008), Google Scholar [Citation](#)



EDUCATION

1990 May PhD physics, Niels Bohr Institute, Univ Copenhagen, Denmark
1986 August MSc physics, Niels Bohr Institute, Univ Copenhagen, Denmark

CURRENT POSITION

2012 – present Professor of Theoretical Physics and Head of Biophysics and Fluids Section at Department of Physics, Technical University of Denmark (DTU), Denmark

PREVIOUS POSITIONS

2005 – 2012 Professor and Head of Theory Section, Department of Micro- and Nanotechnology, DTU
2001 – 2004 Associate Professor, Department of Micro- and Nanotechnology, DTU, Denmark
1996 – 2001 Associate Professor, Niels Bohr Institute, University of Copenhagen, Denmark
1994 – 1996 Postdoctoral Fellow, Centre for Very Low Temperatures, CNRS Grenoble, France
1992 – 1994 Postdoctoral Fellow, Department of Applied Physics, Yale University, USA
1990 – 1992 NORDITA Postdoctoral Fellow, Nordic Institute of Theoretical Physics, Denmark

SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

1996 – present • 10 postdocs (e.g. N. Asger Mortensen [prof. @ Univ Southern Denmark], Vadim Cheianov [assoc.prof. Univ Leiden]), • 29 PhD students (e.g. Jesper Nygård [prof. @ Univ Copenhagen], Kaare Hartvig Jensen [assoc.prof. @ Tech Univ Denmark], Brian Møller Andersen [assoc.prof. @ Univ Copenhagen]), • 31 MSc students.

TEACHING ACTIVITIES Planning and executing 58 lecture courses (counting repetition of courses):
2001 – present as prof. at DTU: Theory of Relativity, Electromagn., Theoretical Microfluidics, Lab-on-a-chip Technology, Fluid Dynamics, Nanotechnology, Physiol. Transp. Phenomena, Quantum Mechanics,
1996 – 2001 as assoc.prof. at Niels Bohr Inst., Univ Copenhagen: Many-Particle Physics, Cond.Mat.Phys.

ORGANISATION OF SCIENTIFIC MEETINGS AND SUMMER SCHOOLS

2013 – present Co-org. Acoustofluidics Conf., 80 part. (UK-13, IT-14, FR-15, [Chair DK-16](#), US-17, [FR-18](#))
2004 – present Co-org. Summer School Complex Motion in Fluids, 60 part. (04, 07, 09, 11, 13, 2015-[2018](#))
2013 – 2016 Member Executive Tech Program Committee, MicroTAS Conf. (D,US,KR,IE) 1200 particip.
2012 Co-organizer, Lorentz Center Workshop on Acoustic Waves, 52 participants, NL
2008, 2012 Co-organizer, Special Symposia, 40 participants, ICTAM (Adelaide 2008, Beijing 2012)
2010 Co-organizer, CISM Summer School on Ultrasound in Microdevices, 50 participants, Italy

INSTITUTIONAL RESPONSIBILITIES

2021 – 2023 Head of Studies Physics and Nanotechnology (BSc)
2005 – present Section Head and member of Department Leader Group, Technical University of Denmark
2001 – present Faculty member and Graduate Student advisor, Technical University of Denmark
1996 – 2001 Faculty member and Graduate Student advisor, Niels Bohr Inst, Univ Copenhagen, DK

COMMISSIONS OF TRUST

2015 – 2017 Committee member [Young Investigator Program](#), Villum Foundation, grants 20 MEUR/yr
2005 – present Evaluator of 19 professorships: DTU(2×2018,2017,2×2016,2015,2013), Montreal Polytech (2016), Univ Lille (2015), UC Santa Barbara (2015,2010), MIT (2015,2011), UC San Diego (2014), Paris Diderot (2013), Aalborg Univ (2012), Purdue Univ (2009), Vestfold Univ (2006), Univ Hannover (2005).

HONORS AND MEMBERSHIPS OF SCIENTIFIC SOCIETIES

2020 – present Elected Member, *Royal Danish Academy of Sciences and Letters*, since Sep 2020
2011 – present Elected Fellow, *American Physical Society*, member since 1992
2013 April Teacher of the Year, Technical University of Denmark, Denmark
2008 – present Member, *Ultrasonic Standing Wave Network*, Vice President 2017–19, President 2019–21
1984 – present Member, *Danish Physical Society*, Vice President 2000 – 2002, President 2002 – 2004

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PUBLICATION BIBLIOMETRICS

h-index 47 [[ResearcherID](#), ISI Web of Science]

7357 journal paper citations [ISI Web of Science]

3719 book citations [[Google Scholar Citation](#)]

163 peer-reviewed papers in international journals
and of these papers: **6** as single author, **19** as first author,
80 as last author, **69** include international co-authors.

228 peer-reviewed/invited papers at intl. conferences

67 other conference contributions at intl. conferences

2 monographs and 3 book chapters:

[Theoretical Microfluidics](#)

H. Bruus (346 pp., Oxford University Press, 2008) [**2034 citations, 3479 copies sold**]

[Many-Body Quantum Theory in Condensed Matter Physics](#)

H. Bruus and K. Flensberg (435 pp., Oxford University Press, 2nd Edition 2016) [**1685 cits., 4889 sold**]

[Chapters 1, 2, and 4 in: Microscale Acoustofluidics](#),

H. Bruus, Eds. T. Laurell and A. Lenshof, (570 pp. Royal Society of Chemistry, 2015)



RESEARCH INTERESTS

Theoretical physics in general. **Present research** covers theory and simulation of microfluidics, hydrodynamics, lab-on-a-chip systems, cell handling, biofluidics, bio-mimicking, electrokinetics, acoustics, and osmosis. **Previous research** covered quantum transport of electrons, mesoscopic physics, quantum chaos, strongly correlated electron systems, quantum Hall effect, high- T_c superconductivity and Mössbauer spectr.

MAIN GRANTS (in kEUR) AS PRINCIPAL OR CO-INVESTIGATOR (PI or Co-I)

[IRFD = Independent Research Fund Denmark = the Danish national research foundation]

kEUR (Role)

2019-22: EuroStars/Innovation Fund Denmark: ACOUPLAST (996 kEUR), work pack leader	216 (co-I)
2019-21: VILLUM Experiment Grant: Acoustic handling of nanoparticles	260 (PI)
2018-22: EC FET-OPEN, BioWings (2996 kEUR), work package leader	371 (co-I)
2018-21: IRFD FNU Research Project, a novel acoustic body force in inhomogeneous fluids	345 (PI)
2018-21: IRFD FTP Research Project, all-polymer acoustofluidic chips	342 (PI)
2002-18: 12 DTU PhD Research Projects at Technical University of Denmark	2,110 (PI)
2013-17: Wallenberg Foundation Project (3800 kEUR), acoustofluidics, work package leader	100 (co-I)
2012-15: IRFD FTP Research Project, acoustofluidics	310 (PI)
2009-12: IRFD FTP Research Project, acoustofluidics	350 (PI)
2008-12: Danish Council Strategic Research NABIIT Research Project, on-chip cell handling	1,100 (co-I)
2005-10: IRFD FTP Frame Programme (1500 kEUR), WP microfluidics	190 (co-I)
2005-09: EC 6th Frame Programme, (2000 kEUR), Work Package Leader, microfluidic chips	520 (co-I)
2003-05: IRFD FTP Research Project, theoretical microfluidics	170 (PI)
2004-06: Ministry of Technology, Industrial PhD Research Project, on-chip micropumps	190 (PI)
1997-01: IRFD Ole Rømer Assoc. Research Professorship, Univ Copenhagen	700 (PI)

REFeree FOR INTERNATIONAL JOURNALS. Physical Review Letters, Physical Review E, Physical Review Applied, Physical Review Fluids, Physics of Fluids, Journal of Fluid Mechanics, Lab on a Chip, Microfluidics and Nanofluidics, Wave Motion, PNAS, International Journal of Heat and Mass Transfer.

VISITING PROFESSOR

2014 (1 month) ESPCI ParisTech, France. **2013** (1 month) Université Paris Diderot, France. **2010** (3 months) Princeton University (NJ), USA. **2010** (3 months) Massachusetts Institute of Technology - MIT (MA), USA. **2010** (6 months) University of California Santa Barbara (CA), USA. **2007** (2 months) ESPCI Paris-Tech, Paris, France. **2001** (2 months) Harvard University, Cambridge (MA), USA.

MANAGEMENT EXPERIENCE

Member of the DTU Physics Management Group (Apr 2012 – present)

Head of the Fluids Section, DTU Physics (Apr 2012 – present) [20 people]

Head of Theoretical Microfluidics Group, DTU Physics (Apr 2012 – present) [6 people]

Member of the DTU Nanotech Management Group (Jan 2005 – Mar 2012)

Head of the Theory Section, DTU Nanotech (Jan 2005 – Mar 2012) [30 people]

Interim Head of the MEMS Section, DTU Nanotech (Jan 2006 – Oct 2009) [30 people]

Head of Theoretical Microfluidics Group, DTU Nanotech (Dec 2001 – Mar 2012) [8 people]

PEER-REVIEWED JOURNAL PUBLICATIONS THE PAST FIVE YEARS (2018-22)

[see the complete publication list at www.staff.dtu.dk/bruus]

- 140.** J. T. Karlsen, W. Qiu, P. Augustsson, and **H. Bruus**
Acoustic streaming and its suppression in inhomogeneous fluids
Phys. Rev. Lett. **120**, 054501 1-6 (2018). [[pdf](#)]
- 141.** A. Fornell, F. Garofalo, J. Nilsson, **H. Bruus**, and M. Tenje
Intra-droplet acoustic particle focusing: simulations and experimental observations
Microfluid Nanofluid **22**, 75 1-9 (2018). [[pdf](#)]
- 142.** J. S. Bach and **H. Bruus**
Theory of pressure acoustics with viscous boundary layers and streaming in curved elastic cavities
J. Acoust. Soc. Am. **144**, 766-784 (2018). [[pdf](#)]
- 143.** R. P. Moiseyenko and **H. Bruus**
Whole-system ultrasound resonances as the basis for acoustophoresis in all-polymer microfluidic devices
Phys. Rev. Appl. **11**, 014014 1-14 (2019). [[pdf](#)]
- 144.** N. R. Skov, J. S. Bach, B. G. Winckelmann, and **H. Bruus**
3D modeling of acoustofluidics in a liquid-filled cavity including streaming, viscous boundary layers, surrounding solids, and a piezoelectric transducer
AIMS Math. **4**, 99-111 (2019). [[pdf](#)]
- 145.** W. Qiu, J. T. Karlsen, **H. Bruus**, and P. Augustsson
Characterization of acoustic streaming in gradients of density and compressibility
Phys. Rev. Appl. **11**, 024018 1-11 (2019). [[pdf](#)]
- 146.** S. Liu, Z. Ni, G. Xu, X. Guo, J. Tu, **H. Bruus**, and D. Zhang
Two-dimensional mapping separating the acoustic radiation force and streaming in microfluidics
Phys. Rev. Appl. **11**, 044031 1-10 (2019). [[pdf](#)]
- 147.** P Delsing, A N Cleland, M J A Schuetz, J Knörzer , G Giedke , J I Cirac, K Srinivasan, M Wu, K Balram, C Bäuerle, T Meunier, C J B Ford, P V Santos, E Cerda-Méndez, H Wang, H J Krenner, E D S Nysten, M Weiss, G R Nash, L Thevenard, C Gourdon, P Rovillain, M Marangolo, J-Y Duquesne, G Fischerauer, W Ruile, A Reiner, B Paschke, D Denysenko, D Volkmer, A Wixforth, **H Bruus**, M Wiklund, J Reboud, J M Cooper, Y Q Fu, M S Brugger, F Rehfeldt, and C Westerhausen
The 2019 surface acoustic waves roadmap. J. Phys. D: Appl. Phys. **52**, 353001 1-40 (2019). [[pdf](#)]
- 148.** J. S. Bach and **H. Bruus**
Bulk-driven acoustic streaming at resonance in closed microcavities
Phys. Rev. E **100**, 023104 1-20 (2019). [[pdf](#)]
- 149.** N.R. Skov, P. Sehgal, B. J. Kirby, and **H. Bruus**. *Three-Dimensional Numerical Modeling of Surface Acoustic Wave Devices: Acoustophoresis of Micro- and Nanoparticles including Streaming*
Phys. Rev. Appl. **12**, 044028 1-17 (2019). [[pdf](#)]
- 150.** J. S. Bach and **H. Bruus**
Theory of acoustic trapping of microparticles in capillary tubes
Phys. Rev. E **101**, 023107 1-12 (2020). [[pdf](#)]
- 151.** W.N. Bodé, L. Jiang, T. Laurell, and **H. Bruus**
Microparticle acoustophoresis in aluminum-based acoustofluidic devices with PDMS covers
Micromachines **11**, 292 1-15 (2020). [[pdf](#)]
- 152.** J. S. Bach and **H. Bruus**
Suppression of acoustic streaming in shape-optimized channels
Phys. Rev. Lett. **124**, 214501 1-6 (2020). [[pdf](#)]
- 153.** G. Xu, Z. Ni, X. Chen, J. Tu, X. Guo, **H. Bruus**, and D. Zhang
Acoustic characterization of polydimethylsiloxane for microscale acoustofluidics
Phys. Rev. Appl. **13**, 054069 1-13 (2020). [[pdf](#)]
- 154.** W. Qiu, **H. Bruus**, and P. Augustsson. *Particle-size-dependent acoustophoretic motion and depletion of micro- and nano-particles at long timescales*
Phys. Rev. E **102**, 013108, 1-11 (2020). [[pdf](#)]

- 155.** A. Tahmasebipour, L. Friedrich, M. Begley, **H. Bruus**, and C. Meinhart
Toward optimal acoustophoretic microparticle manipulation by exploiting asymmetry
J. Acoust. Soc. Am. **148**, 359-373 (2020). [[pdf](#)]
- 156.** B. Hammarström, N. R. Skov, K. Olofsson, **H. Bruus**, and M. Wiklund
Acoustic trapping based on surface displacement of resonance modes
J. Acoust. Soc. Am. **149**, 1445-1453 (2021). [[pdf](#)]
- 157.** W. N. Bodé and **H. Bruus**
Numerical study of the coupling layer between transducer and chip in acoustofluidic devices
J. Acoust. Soc. Am. **149**, 3096-3105 (2021). [[pdf](#)]
- 158.** J. H. Joergensen and **H. Bruus**
Theory of pressure acoustics with thermoviscous boundary layers and streaming in elastic cavities
J. Acoust. Soc. Am. **149**, 3599-3610 (2021). [[pdf](#)]
- 159.** B. G. Winckelmann and **H. Bruus**
Theory and simulation of electroosmotic suppression of acoustic streaming
J. Acoust. Soc. Am. **149**, 3917-3928 (2021). [[pdf](#)]
- 160.** F. Lickert, M. Ohlin, **H. Bruus**, and P. Ohlsson
Acoustophoresis in polymer-based microfluidic devices: modeling and experimental validation
J. Acoust. Soc. Am. **149**, 4281-4291 (2021). [[pdf](#)]
- 161.** A. G. Steckel, **H. Bruus**, P. Murali, and R. Matloub
Fabrication, characterization, and simulation of glass devices with AlN thin-film transducers for excitation of ultrasound resonances. Phys. Rev. Appl. **16**, 014014 1-10 (2021). [[pdf](#)]
- 162.** A. G. Steckel and **H. Bruus**
Numerical study of bulk acoustofluidic devices driven by thin-film transducers and whole-system resonance modes. J. Acoust. Soc. Am. **150**, 634-645 (2021). [[pdf](#)]
- 163.** W. Qiu, J. H. Joergensen, E. Corato, **H. Bruus**, and P. Augustsson
Fast microscale acoustic streaming driven by a temperature-gradient-induced non-dissipative acoustic body force. Phys. Rev. Lett. **127**, 064501 1-6 (2021) [[pdf](#)]
- 164.** J. H. Joergensen and **H. Bruus**
Theory and modeling of nonperturbative effects at high acoustic energy densities in thermoviscous acoustofluidics. **Submitted**, pp. 1-15, ArXiv (2022) [[pdf](#)]
- 165.** J. H. Joergensen, W. Qiu, and **H. Bruus**
A transition from boundary- to bulk-driven acoustic streaming due to nonlinear thermoviscous effects at high acoustic energy densities. **Submitted**, pp. 1-6, ArXiv (2022) [[pdf](#)]
- 166.** A. G. Steckel and **H. Bruus**
Numerical study of acoustic cell trapping above elastic membrane disks driven in higher-harmonic modes by thin-film transducers with patterned electrodes. **Submitted**, pp. 1-15, ArXiv (2022). [[pdf](#)]
- 167.** W. N. Bodé, F. Lickert, P. Augustsson, and **H. Bruus**
Determination of the complex-valued elastic moduli of polymers by electrical impedance spectroscopy for ultrasound applications. **Submitted**, pp. 1-10, ArXiv (2022). [[pdf](#)]