

CV of Dr. Per Augustsson

1. Degrees

- **Docent:** Biomedical engineering at Lund University since 2017
- **PhD Degree** (2011-12-02): Electrical Measurements, Lund University, Sweden. Thesis title: "On microchannel acoustophoresis – Experimental considerations and life science applications". Supervisor: Thomas Laurell.
- **Higher education:** 2006, MSc Engineering Physics, Lund University, Sweden; 2002-2003, Musician training program, The Royal Danish Academy of Music, Denmark

2. Employment

- Senior Lecturer (Universitetslektor, 90% research, 10% teaching), Dept. of Biomedical Engineering, Lund University, Sweden. 2017 – present
- Researcher, Dept. Biomedical Engineering, Lund University, Sweden. 2016 – 2017
- Product manager at AcouSort AB, 2015 – 2018 (part time)
- Postdoctoral Fellow at Massachusetts Institute of Technology, Cambridge, MA, USA. Employed by Lund University, Sweden, 2014-2015
- Consulting in research and development of medical device, 2013 – 2015 (part time)
- Researcher, Dept. Measurement Technology and Industrial Electrical Engineering, Lund University, Sweden. 2012-2013, 100% research
- PhD position, Dept. of Measurement Technology and Industrial Electrical Engineering, Lund University, Sweden. 2007-2011, 80% research, 20% teaching
- Project assistant, Dept. of Electrical Measurements, Lund University, Sweden. 2006-2007, 100% research

3. Breaks in research

- Parental leave: September-December 2013 (4 months, 100%)
- Parental leave: November 2017 – March 2018 (80%)
- Parental leave: January 2020 – June 2020 (50%, planned)

4. Postdoc stay

- 2013-2015, Postdoctoral Fellow at Massachusetts Institute of Technology, Cambridge, MA, USA. Funded by the Swedish Research Council and supported by the Birgit and Hellmuth Hertz' Foundation.

5. Academic externally acquired funds – 44.6 MSEK

- ERC starting grant (852590, ABODYFORCE), 2019-2024 (5 years), ~20 MSEK
- SSF – Future research leader (FFL18-0122), 2020-2024 (5 years), 12 MSEK
- Eurostars – Vinnova (E!113461, ACOUPLAST), 2019-2021 (3 years), 1 MSEK
- SSF Ingvar Carlsson award (ICA16-0002), 2017-2021 (4 years), 4 MSEK
- VR starting grant (04836), 2017-2020 (4 years), 3.5 MSEK

6. Prizes, fellowships, and awards

1. ERC starting grant 2019 (ABODYFORCE), 2 MEUR.
2. Future Research Leader 7. (FFL18-0122), 12 MSEK, The Swedish Foundation for Strategic Research
3. Invar Carlsson Award 2017, for postdocs returning to Sweden from abroad. Award sum: 60,000 SEK personal grant and 4 MSEK research funds. The Swedish Foundation for Strategic Research
4. PhD-thesis of the year 2011 at the Faculty of Engineering, Lund University, Sweden. Award sum: 100,000 SEK from Sparbanksstiftelsen Färs och Frosta.

5. The Phabian Award – Best PhD-thesis in pharmaceutical and bioanalytical research in the period May 2011 and April 2013. Apotekarsocieteten, Sweden.

7. Pedagogical training in higher education: 10 weeks

8. Teaching

- Course coordinator, lecturer and examiner for *Introduction to Microfluidics and Lab-on-a-chip Systems*, Lund University
- Lecturer: *Computerized Measurement Systems, Electrical measurements, and Ultrasound Physics and Technology*, Lund University
- Supervisor of > 20 shorter student projects at Lund University

9. Advisor/Supervisor experience

- Wei Qiu (**postdoc**), 3D acoustic phenomena, 2019-2022
- Ola Jakobsson (**postdoc**), Blood component separation, 2020-2022
- Mahdi Rezayati Charan (**PhD-student**), Measuring cell properties, 2018-2022
- Franziska Martens (**PhD-student**), Thermal acoustic convection, 2020-2024
- Richard Soller (**PhD-student**), Dense suspension acoustics, 2020-2024
- Enrico Corato (**PhD-student**), Acoustic nanoparticle separation, 2020-2024
- Co-supervisor of 3 present PhD-students and 2 finished PhDs
- Main supervisor of 10 MSc stud. and co-supervisor of 4 MSc stud.
- Main supervisor of 1 BSc student

10. Review and editorial assignments:

1. Committee member at PhD defense 6 times, at Chalmers, Linköping University, Lund University, and KTH Royal Institute of Technology
2. Opponent at one mid-term review and one licentiate seminar at Lund University
3. Examiner of 4 Master's thesis students
4. Observer at the Nobel Symposium in Microfluidics, June 5-8, 2017.
5. Peer reviewer for: Nature Physics, Physical Review Letters, Nature Communications, Communications physics, Small, Lab on a Chip, Analytical Chemistry, PLOS ONE, Microfluidics and Nanofluidics, Physical Review Fluids, RCS Advances, Physical Review Applied, Micromachines, Microfluidics and Nanofluidics.

11. Communicating with stake-holders

1. I am since 2015 scientific advisor for the Lund University spin out company AcouSort AB that commercializes solutions based on acoustofluidics in the Life Science area.
2. 2 granted patents, 2 active applications, 3 inactive applications in the area of acoustofluidics

12. Invited keynote presentations at international conferences (30+ min)

1. Invited speaker at the conference Acoustofluidics 2016, Kongens Lyngby, Denmark, Title: Iso-acoustophoresis
2. Invited speaker at the 2017 IEEE International Ultrasonics Symposium, Washington, DC, USA, Title: Shaping Acoustofluidic Landscapes to Profile and Separate Cells and Sub-micron Particles (September 2017)
3. Invited speaker at the Microfluidics congress 2017, London, UK, Title: Iso-acoustic focusing organizes cells and liquids based on their acoustic properties (December 2017)
4. Invited speaker at the Microfluidics Consortium Open Day 2020 (Centre for Business Innovation), On-line, Title: Sound to control cells and nanoparticles (November 2020)

Publications

Publications

- 26 Peer reviewed original articles
- +40 Peer reviewed conference abstracts
- 1 Peer reviewed tutorial review
- 2 Book chapters

Citation report (2020-12-16)

- Sum of the Times Cited (WoS): 1499
- Citing Articles (WoS): 785
- Average Citations/Item (WoS): 55.52
- H-index: 20 (WoS), 22 (GS)

ORCID: <https://orcid.org/0000-0001-8542-7924>

Scopus: <https://www.scopus.com/authid/detail.uri?authorId=55098887700>

10 selected publications

Sound can push and re-organize cells and particles. I focus my research efforts on discovery of novel phenomena and techniques relating to resonant ultrasound. As principal investigator I discovered a new acoustic body force on layered liquids of different acoustic properties inside short wavelength resonators. This lay the ground for my current line of research. [1]

1. Deshmukh, S., Z. Brzozka, T. Laurell and **P. Augustsson** (2014). "Acoustic radiation forces at liquid interfaces impact the performance of acoustophoresis." Lab on a Chip **14**(17): 3394-3400. Times Cited: 34

In close collaboration with physicist Henrik Bruus at the Technical University of Denmark, I study in detail the fundamentals of sound interacting with cells and particles inside microfluidic channel networks by Particle Imaging Velocimetry and by 3D Particle Tracking, and matching experiments with theory. [2-4]

2. Qiu, W., H. Bruus and **P. Augustsson** (2020). "Particle-size-dependent acoustophoretic motion and depletion of micro- and nano-particles at long timescales." Physical Review E **102**(1). Times Cited: 0
3. Qiu, W., J. T. Karlsen, H. Bruus and **P. Augustsson** (2019). "Experimental Characterization of Acoustic Streaming in Gradients of Density and Compressibility." Physical Review Applied **11**(2). Times Cited: 12
4. **Augustsson, P.**, R. Barnkob, S. T. Wereley, H. Bruus and T. Laurell (2011). "Automated and temperature-controlled micro-PIV measurements enabling long-term-stable microchannel acoustophoresis characterization." Lab on a Chip **11**(24): 4152-4164. Times Cited: 100

The notion that sound can re-organize liquid streams as well as suspended objects lead to the invention of Iso-acoustic focusing that I developed during my international postdoc at MIT.

This work was ground-breaking in my research field. [5]

5. **Augustsson, P.**, J. T. Karlsen, H. W. Su, H. Bruus and J. Voldman (2016). "Iso-acoustic focusing of cells for size-insensitive acousto-mechanical phenotyping." Nature Communications **7**. Times Cited: 87

Acoustic control of fluid streams also allowed us to expand the size range of particles that can be controlled in acoustic fields to include also sub-micron particles. [6]

6. Van Assche, D., E. Reithuber, W. Qiu, T. Laurell, B. Henriques-Normark, P. Mellroth, P. Ohlsson and **P. Augustsson** (2020). "Gradient acoustic focusing of sub-micron particles for separation of bacteria from blood lysate." Scientific Reports **10**(1). Times Cited: 3

In two recent papers in Physical Review Letters we describe and validate experimentally a new theoretical framework for the interaction of sound with layered liquids of inhomogeneously distributed acoustic properties. The following encouraging statement is a quote from the anonymous peer-review report of one of the papers: *This result is from my point of view among the most original results obtained in the field of nonlinear acoustics in the last decade.* [7-8]

7. Karlsen, J. T., W. Qiu, **P. Augustsson** and H. Bruus (2018). "Acoustic Streaming and Its Suppression in Inhomogeneous Fluids." Physical Review Letters **120**(5). Times Cited: 23
8. Karlsen, J. T., **P. Augustsson** and H. Bruus (2016). "Acoustic Force Density Acting on Inhomogeneous Fluids in Acoustic Fields." Physical Review Letters **117**(11). Times Cited: 36

Through extensive collaborations with biomedical researchers and clinicians and through my activities in the spin-off company AcouSort AB I develop new applications of acoustic focusing technology to address their challenging problems. [9-10]

9. Antfolk, M., C. Antfolk, H. Lilja, T. Laurell and **P. Augustsson** (2015). "A single inlet two-stage acoustophoresis chip enabling tumor cell enrichment from white blood cells." Lab on a Chip **15**(9): 2102-2109. Times Cited: 58
10. **Augustsson, P.**, C. Magnusson, M. Nordin, H. Lilja and T. Laurell (2012). "Microfluidic, Label-Free Enrichment of Prostate Cancer Cells in Blood Based on Acoustophoresis." Analytical Chemistry **84**(18): 7954-7962. Times Cited: 195

My other journal publications

11. Petersson, K., O. Jakobsson, P. Ohlsson, **P. Augustsson**, S. Scheduling, J. Malm and T. Laurell (2018). "Acoustofluidic hematocrit determination." Analytica chimica acta **1000**: 199-204. Times Cited: 6
12. Ohlsson, P., K. Petersson, **P. Augustsson** and T. Laurell (2018). "Acoustic impedance matched buffers enable separation of bacteria from blood cells at high cell concentrations." Scientific Reports **8**. Times Cited: 18
13. Magnusson, C., **P. Augustsson**, A. Lenshof, Y. Ceder, T. Laurell and H. Lilja (2017). "Clinical-Scale Cell-Surface-Marker Independent Acoustic Microfluidic Enrichment of Tumor Cells from Blood." Analytical Chemistry **89**(22): 11954-11961. Times Cited: 21
14. Zalis, M. C., J. F. Reyes, **P. Augustsson**, S. Holmqvist, L. Roybon, T. Laurell and T. Deierborg (2016). "Label-free concentration of viable neurons, hESCs and cancer cells by means of acoustophoresis." Integrative Biology **8**(3): 332-340. Times Cited: 15
15. Antfolk, M., C. Magnusson, **P. Augustsson**, H. Lija and T. Laurell (2015). "Acoustofluidic, Label-Free Separation and Simultaneous Concentration of Rare Tumor Cells from White Blood Cells." Analytical Chemistry **87**(18): 9322-9328. Times Cited: 78
16. Antfolk, M., P. B. Muller, **P. Augustsson**, H. Bruus and T. Laurell (2014). "Focusing of sub-micrometer particles and bacteria enabled by two-dimensional acoustophoresis." Lab on a Chip **14**(15): 2791-2799. Times Cited: 80

17. Muller, P. B., M. Rossi, A. G. Marin, R. Barnkob, **P. Augustsson**, T. Laurell, C. J. Kahler and H. Bruus (2013). "Ultrasound-induced acoustophoretic motion of microparticles in three dimensions." Physical Review E **88**(2). Times Cited: 96
18. Burguillos, M. A., C. Magnusson, M. Nordin, A. Lenshof, **P. Augustsson**, M. J. Hansson, E. Elmer, H. Lilja, P. Brundin, T. Laurell and T. Deierborg (2013). "Microchannel Acoustophoresis does not Impact Survival or Function of Microglia, Leukocytes or Tumor Cells." Plos One **8**(5). Times Cited: 78
19. Grenvall, C., J. R. Folkenberg, **P. Augustsson** and T. Laurell (2012). "Label-free somatic cell cytometry in raw milk using acoustophoresis." Cytometry Part a **81A**(12): 1076-1083. Times Cited: 21
20. Barnkob, R., **P. Augustsson**, T. Laurell and H. Bruus (2012). "Acoustic radiation- and streaming-induced microparticle velocities determined by microparticle image velocimetry in an ultrasound symmetry plane." Physical Review E **86**(5). Times Cited: 140
21. **Augustsson, P.**, J. Malm and S. Ekstrom (2012). "Acoustophoretic microfluidic chip for sequential elution of surface bound molecules from beads or cells." Biomicrofluidics **6**(3). Times Cited: 8
22. **Augustsson, P.** and T. Laurell (2012). "Acoustofluidics 11: Affinity specific extraction and sample decomplexing using continuous flow acoustophoresis." Lab on a Chip **12**(10): 1742-1752. Times Cited: 35
23. Barnkob, R., **P. Augustsson**, T. Laurell and H. Bruus (2010). "Measuring the local pressure amplitude in microchannel acoustophoresis." Lab on a Chip **10**(5): 563-570. Times Cited: 168
24. Grenvall, C., **P. Augustsson**, J. R. Folkenberg and T. Laurell (2009). "Harmonic Microchip Acoustophoresis: A Route to Online Raw Milk Sample Precondition in Protein and Lipid Content Quality Control." Analytical Chemistry **81**(15): 6195-6200. Times Cited: 56
25. **Augustsson, P.**, J. Persson, S. Ekstrom, M. Ohlin and T. Laurell (2009). "Decomplexing biofluids using microchip based acoustophoresis." Lab on a Chip **9**(6): 810-818. Times Cited: 47
26. **Augustsson, P.**, L. B. Aberg, A. M. K. Sward-Nilsson and T. Laurell (2009). "Buffer medium exchange in continuous cell and particle streams using ultrasonic standing wave focusing." Microchimica Acta **164**(3-4): 269-277. Times Cited: 50
27. Persson, J., **P. Augustsson**, T. Laurell and M. Ohlin (2008). "Acoustic microfluidic chip technology to facilitate automation of phage display selection." Febs Journal **275**(22): 5657-5666. Times Cited: 34