

# CURRICULUM VITAE

Peter Husen  
Glentevej 43  
5000 Odense C  
Denmark

E-mail: [peter@husen.dk](mailto:peter@husen.dk)  
Phone: +45 5155 5171



**Born:** November 1, 1982

**Family status:** Live with my wife, Kamilla, her two children, Anna and Marie, and our mutual daughters, Clara Pi and Lilly.

## Research Interests

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I have a combined background in Physics and Computer Science and have specialized in computationally intensive studies of complex biomolecular systems:

- Monte Carlo methods using the Wang-Landau entropic sampling approach to determine free energy landscapes of biopolymers and molecular motors
- Specialized imaging techniques to study domain formation on spherical lipid membranes
- Multiscale studies of biological macromolecules combining molecular dynamics with quantum chemical calculations.

## Employment History

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- 2018 - :** Assistant professor in the QuantBioLab group at the Department of Physics, Chemistry and Pharmacy (FKF), University of Southern Denmark (SDU)
- Multiscale studies of protein systems, combining molecular dynamics simulations with quantum chemical calculations
  - Co-development of the VIKING software package
- 2017 - 2018:** Software developer in the QuantBioLab group, FKF, SDU
- 2015 - 2017:** Postdoc in the QuantBioLab group, FKF, SDU
- 2012 - 2015:** Software developer at EmaZys Technologies ApS
- Software development for controlling measurements, data analysis and visualization
  - General research and development of diagnostic technologies
  - System and network administration
- 2011 - 2012:** Postdoc in the Functional Lipidomics group at the Department of Biochemistry and Molecular Biology, University of Southern Denmark

- Development of software to extract quantitative data of lipid contents from mass spectrometry using an Orbitrap mass spectrometer.
- Design of the workflow for further data analysis and data mining

**2008 - 2011:** PhD Fellow at the Department of Physics and Chemistry, University of Southern Denmark. Affiliated with the MEMPHYS Center for Biomembrane Physics

- Development of software and methods for image analysis of 3D confocal microscopy image data of spherical membranes.
- Teaching of Quantum Mechanics, Classical Mechanics, first year Physics lab courses and Physics for medical students

**2005 - 2007:** Teaching assistant in physics courses at the Department of Physics and Chemistry, University of Southern Denmark

**1997 - 2006:** IT assistant at Odense City Museums

- Software development, technical problem solving and user support.

## Education

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**2011:** PhD in biophysics at the University of Southern Denmark (SDU) with the dissertation "Physical characterization of membrane domains"

- In this project, I developed software and methods for image analysis of 3D confocal microscopy images of spherical lipid membranes. The software produces an image on a surface mesh from a 3D bitmap to allow studies of the surface structure. This further allows the study of the thermodynamic phases in the lateral structure of lipid membranes. The project has aspects of physics, geometry and computer science.

**2008.:** M.Sc. in combined physics and computer science with the Master's project "Computer Simulations of Molecular Motors" at SDU

- In my Master's project, I carried out Monte Carlo simulations of the molecular kinesin and its electrostatic and steric interactions with itself and a microtubule. The project involved development and optimization of algorithms for dealing with a large number of electrostatic interactions and development of a scheme for parallelization of the Wang Landau algorithm for Monte Carlo simulations. The calculations were performed on supercomputer Horseshoe (<http://www.dcsc.sdu.dk/>) at SDU.

**2005:** B.Sc. in Physics and Computer Science with the Bachelor's Project ("Tight-binding metoden til undersøgelse af faste stoffers elektroniske struktur") at SDU

- Calculation of the electronic band structure in semiconductor crystals based on the tight-binding model.

**2002:** Matematisk studentereksamen at Odense Katedralskole

## Awards / Grants

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- 2016:** Danish e-Infrastructure Cooperation (DeIC): HPC grant, Abacus 2.0  
**2007:** Oticon stipend for Master's project in Physics (DKK 100.000)

## Patents

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- 2015:** "Method and system of fault detection and localisation in dc-systems",  
International Application No. PCT/DK2015/050215 (pending)

## Other Experience

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- 2009:** Stayed at the Laboratory of Scientific Image Analysis (SCIAN-Lab) at the Faculty of Medicine, University of Chile, Santiago, Chile as part of the PhD program  
**2006 - 2007:** President of the physics student union "Fysisk Fagråd" and co-founder of the new union "Æter" for all students at the Department of Physics and Chemistry, SDU

## Languages

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- Danish as native language
- Fluent in spoken and written English.

## Programming Languages

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Strong experience with the following languages

- C / C++
- Python
- PHP
- Java
- BASIC / Visual Basic
- Javascript
- ASP
- SQL
- Bash
- Octave/Matlab
- .NET
- Maple
- Fortran
- HTML
- Qt
- TCL

Some experience with

- Pascal
- Haskell
- Prolog
- Assembler for Sparc and x86

## Other IT experience

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- Strong experience with Linux and UNIX-like systems
- Experience with the database systems MySQL, PostgreSQL, MSSQL, SQLite and Access
- Broad experience with numerical methods, simulations and data analysis on large datasets
- Experience with embedded systems (Linux on ARM) and microcontroller programming

## List of Publications

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### Summary:

9 peer-reviewed publications, 2 journal covers, 144 citations, h-index: 6

<https://scholar.google.dk/citations?user=3jEHjaAAAAAJ>



### Journal articles

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Adrian Bøgh Salo, **Peter Husen** and Ilia A. Solov'yov. Charge Transfer at the Q<sub>o</sub>-Site of the Cytochrome bc<sub>1</sub> Complex Leads to Superoxide Production. *The Journal of Physical Chemistry B*, 2016, DOI: 10.1021/acs.jpcc.6b10403

**Peter Husen** and Ilia A. Solov'yov. Mutations at the Q<sub>o</sub> Site of the Cytochrome bc<sub>1</sub> Complex Strongly Affect Oxygen Binding. *The Journal of Physical Chemistry B*, 2016, DOI: 10.1021/acs.jpcc.6b08226

**Peter Husen** and Ilia A. Solov'yov. Spontaneous Binding of Molecular Oxygen at the Q<sub>o</sub>-Site of the bc<sub>1</sub> Complex Could Stimulate Superoxide Formation. *Journal of the American Chemical Society* Vol 138, Issue 37, 2016, 12150–12158

Tripta Bhatia, **Peter Husen**, Jonathan Brewer, Luis A. Bagatolli, Per L. Hansen, John H. Ipsen, and Ole G. Mouritsen. Preparing giant unilamellar vesicles (GUVs) of complex lipid mixtures on demand: Mixing small unilamellar vesicles of compositionally heterogeneous mixtures. *Biochimica et Biophysica Acta (BBA) - Biomembranes* Vol 1848, 2014, 3175–3180

Tripta Bhatia, **Peter Husen**, John H. Ipsen, Luis A. Bagatolli, Adam Cohen Simonsen. Fluid domain patterns in free-standing membranes captured on a solid support. *Biochimica et Biophysica Acta (BBA)-Biomembranes* Vol 1838, Issue 10, 2014, 2503-2510

**Peter Husen**, Kirill Tarasov, Maciej Katafiasz, Elena Sokol, Johannes Vogt, Jan Baumgart, Robert Nitsch, Kim Ekroos, Christer S. Ejsing. Analysis of Lipid Experiments (ALEX): A Software Framework for Analysis of High-Resolution Shotgun Lipidomics Data, *PLoS one*. Vol 8, No 11, 2013

**Peter Husen**, Laura R. Arriaga, Francisco Monroy, John H. Ipsen and Luis A. Bagatolli. Morphometric image analysis of giant vesicles: a new tool for quantitative thermodynamics studies of phase-separation in lipid membranes. *Biophysical Journal* Vol 103, No 11, 2012, 2304-2310.

**Peter Husen**, Matthias Fidorra, Steffen Härtel, Luis A. Bagatolli, and John H. Ipsen. A method for analysis of lipid vesicle domain structure from confocal image data. *European Biophysics Journal*. Vol 41, No 2, 2011, 161-175

### Book chapters

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Christer S. Ejsing, **Peter Husen**, and Kirill Tarasov. chap. Lipid Informatics: From a Mass Spectrum to Interactomics. In: *Lipidomics* (ed Kim Ekroos), 147-174 (Wiley-VCH Verlag GmbH and Co. KgaA, 2012)