

Petter Sätterskog

CONTACT INFORMATION

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RESEARCH INTERESTS

New tools for strongly coupled finite density fermions in condensed matter systems: Vector large- and small- N_f limits. Matrix large- N limit. Weak-strong dualities. Entanglement measures. Many-body quantum chaos. Resurgent analysis and transseries.

EDUCATION

Ph.D. Theoretical Physics

Leiden University, The Netherlands ‘September 2013 – September 2017

- Adviser: Professor Koenraad Schalm
- Topic: Quantum Critical Metals
- Schools:
 - [Solvay Doctoral School on “Quantum Field Theory, Strings and Gravity”](#), Brussels, Paris, Amsterdam, September – December 2013
 - [DRSTP Postgraduate School: Statistical Physics and Theory of Condensed Matter](#), Doorn, The Netherlands, January 10 – 21, 2014
 - [DRSTP Postgraduate School: Theoretical High Energy Physics](#), São Paulo, Brazil, January 26 – February 6, 2015
 - [Mathematica Summer School on Theoretical Physics](#), Perimeter Institute, Waterloo, Canada, August 24 – 29 2015
 - [34th Jerusalem Winter School in Theoretical Physics](#), IIAS, Jerusalem, Israel, December 27 – January 5, 2017
- Workshops:
 - [Quantum Matter](#), Benasque, Spain, June 26 – July 08, 2016
 - [Applications of Gauge/Gravity Duality](#), Gotheburg, Sweden, June 2 – 4, 2014
 - [Applications of Gauge/Gravity Duality](#), Gotheburg, Sweden, October 21 – 23, 2015
 - [Applications of Gauge/Gravity Duality](#), Gotheburg, Sweden, October 3 – 5, 2016

M.S. and M.Eng. Physics and Astronomy

Chalmers University of Technology, Gothenburg **September 2012 – June 2013**
Hong Kong University of Science and Technology, HK **September 2011 – June 2012**

- Area of Study: Theoretical Physics
- Thesis Topic: *Holographic Methods for Condensed Matter Physics*
- Adviser: Professor Ulf Gran
- One year exchange to **Hong Kong University of Science and Technology**
- GPA: 5.00/5.00
- Physics GRE: 990/990 (Proof upon request until March 20, 2018)

B.S. Engineering Physics

Chalmers University of Technology, Gothenburg **September 2008 – June 2011**

- Thesis Topic: *GPU Implementation of the Feynman Path-Integral Method in Quantum Mechanics*
- Adviser: Professor Christian Forssén, Subatomic Physics
- GPA: 5.00/5.00

- TALKS
- [1] “Non-Perturbative Two-Point Functions of a Quantum Critical Metal”. Workshop: *Applications of Gauge/Gravity Duality 2016*, Gothenburg, Sweden, **October 3 – 5, 2016**.
- [2] “Non-Perturbative Two-Point Functions of a Quantum Critical Metal”. *Condensed Matter Seminar*, **Perimeter Institute**, Waterloo, Canada, **November 4, 2016**.
- [3] “Non-Perturbative Two-Point Functions of a Quantum Critical Metal”. Condensed matter seminar, **Harvard University**, Cambridge, MA, **November 7, 2016**.
- [4] “Non-Perturbative Two-Point Functions of a Quantum Critical Metal”. Quantum matter seminar, **UC Berkeley**, Berkeley, CA, **December 1, 2016**.
- [5] “Non-Perturbative Two-Point Functions of a Quantum Critical Metal”. Condensed matter group meeting, **Stanford University**, Stanford, CA, **November 30, 2016**.
- REFEREED JOURNAL PUBLICATIONS
- [6] B. Meszema, P. Säterskog, A. Bagrov, K. Schalm, “Non-perturbative emergence of non-Fermi liquid behaviour in $d = 2$ quantum critical metals”, *Phys. Rev. B* **94**, 115134, **Editors’ Suggestion**, [arXiv:1602.05360 [cond-mat.str-el]]
- [7] I. Arefeva, A. Bagrov, P. Säterskog, K. Schalm, “Holographic dual of a time machine”, *Phys. Rev. D* **94**, 044059, [arXiv:1508.04440 [hep-th]]
- PAPERS IN PREPARATION
- [8] P. Säterskog, B. Meszema, K. Schalm, “The non-perturbative spectrum of a $d = 2$ quantum critical metal: a solvable non-Fermi liquid”
- CONFERENCE POSTERS
- [9] “Critical Fermions in Quenched Approximation”. In: *Quantum Matter 2016*, Benasque, Spain, June 26 – July 08, 2016.
- [10] “Bloch-Nordsieck model and critical fermions”. In: *Symposium Trends in Theory 2015*, Dalfsen, The Netherlands, May 28 – 29, 2015.
- TEACHING EXPERIENCE
- Leiden University**, The Netherlands
- Teaching Assistant: Black Holes and Gravitational Waves* **March – April 2014**
- Black board exercise sessions
 - Graded weekly homework problems and exam
 - Answering of students’ questions
- Teaching Assistant: General Relativity* **September – November 2015**
- Graded weekly homework problems and exam
 - Answering of students’ questions
- Teaching Assistant: Effective Field Theory* **February – March 2016**
- Black board exercise sessions
 - Graded weekly homework problems and exam
 - Answering of students’ questions
- Teaching Assistant: Quantum Field Theory* **March – June 2016**
- Graded weekly homework problems and exam
 - Answering of students’ questions
- PROFESSIONAL EXPERIENCE
- European Organization for Nuclear Research**, Geneva, Switzerland

CERN Summer Student at CMS-BRM

June – August 2012

- Development, installation and analysis of results of a Bonner-sphere neutron spectrometer in the CMS experimental cavern at the LHC.
- Participation in lectures about CERN experiments.
- Participation in daily work by CMS-BRM.
- Reference, Moritz Guthoff, moritz.guthoff@cern.ch, CMS-BRM

Subatomic Physics, Chalmers University of Technology, Gothenburg, Sweden

Summer Employment

July – August 2011

- Extension of research done for Bachelor thesis, Path integral Monte Carlo simulations of many-body quantum mechanics on GPUs.
- Reference, Christian Forssén, christian.forssen@chalmers.se

Sectra Secure Communications, Linköping, Sweden

Summer Employment

June – August 2010

- Development and programming of prototype for an encrypted video conferencing program.
- Reference, Jan Boquist, janbo@sectra.se

Saab Group, Linköping, Sweden

Summer Employment at Saab Corporate

June – July 2009

- Java development and programming of a prototype of internal telephone catalog for all of Saab's offices.

Summer Employment at Saab Aerosystems

June – July 2008

- GUI programming in Matlab.

SOFTWARE SKILLS Programming Languages (5000+ lines):

- C, C++, Java, Python

Numerical and Symbolic Analysis:

- Software: Mathematica, MATLAB
- Python libraries: NumPy, SymPy, Matplotlib
- C libraries: GSL, GMP, FFTW
- GPU interfaces: OpenCL, GLSL

Tools:

- Unix, Git, L^AT_EX

AWARDS

2008 National High School Competitions (Sweden)

- 2nd place in National Physics Competition
- 2nd place in National Biology Competition
- 7th place in National Programming Competition

2008 International High School Competitions

- 76th place and bronze medal in *International Biology Olympiad*, Mumbai, India

VOLUNTEERING
SERVICE

THE Port - Humanitarian Hackathon at CERN, 2015–2016

- “We combine creative minds from CERN and non-profit organisations in interdisciplinary teams to work on humanitarian technology related benefits to society.”
- Teams of 8 people are presented with a problem and after 6 weeks of preparations they get together at CERN in Geneva to come up with a prototype.
- My team and I worked on developing a better design for food drop bags used by the ICRC and UNMISS in South Sudan.
- After initially positive drop tests we have continued work on our prototype together with the ICRC.
- ICRC video about our project: <https://youtu.be/5vZqVgclZQ>

HOBBY PROJECTS Independent App Development

- Single-handedly designed, developed and published the educational Android App “Cell Lab: Evolution Sandbox”
- Reached 1,000,000 installs in April 2016, currently ~10,000 installs/day
- 1,000,000+ hours played worldwide (based on always ~100 active connected sessions last year and before).
- Currently first hit on keyword “Cell” in US PlayStore.
- Translated to 7 languages by volunteers.