Asbjørn Bækgaard Lauritsen

Ph.D. student at ISTA, Am Campus 1, 3400 Klosterneuburg, Austria
alaurits@ist.ac.at | ablauritsen.github.io

Education

2020/9–current **Ph.D.**, *Institute of Science and Technology Austria*, Klosterneuburg, Austria.
Thesis: "Energies of Dilute Fermi Gases and Universalities in BCS Theory".
Advisor: Robert Seiringer.

2018/9–2020/6 **M.Sc. in Mathematics**, *University of Copenhagen*, Copenhagen, Denmark.
Thesis: "A mathematical formulation of the Bardeen-Cooper-Schrieffer theory of superconductivity".
Advisor: Jan Philip Solovej.
Highest grade in all courses.

2018/9–2019/2 *ETH Zürich*, Zürich, Switzerland.
Semester abroad as part of the master's degree in Copenhagen.

2015/9–2018/6 **B.Sc. in Mathematics**, *University of Copenhagen*, Copenhagen, Denmark.
Thesis: "Representations of the Poincaré Group".
Advisor: Jan Philip Solovej.
Highest grade in all courses.

2012/8–2015/6 *Frederiksberg Gymnasium*, Frederiksberg, Denmark
Specialisation: Mathematics, Physics and Chemistry on the highest level.
Adjusted average grade of 11,8. (With 12 being the highest.)

2002/8–2012/6 *Nyhollænderskolen*, Frederiksberg, Denmark

History of employment

2015/9–current **Teacher**, *the Danish Physics Olympiad*, Lyngby, Denmark.
Part of the Danish delegation to the International Physics Olympiad (IPhO) in 2017 (in Yogyakarta, Indonesia), 2018 (in Lisbon, Portugal) and 2023 (in Tokyo, Japan) and to the European Physics Olympiad (EuPhO) 2024 (in Kutaisi, Georgia).
Grader at the European Physics Olympiad (EuPhO) 2022 (in Ljubljana, Slovenia).

2016/9–2020/6 **Teachers Assistant**, *University of Copenhagen*, Copenhagen, Denmark.
Teaching all kinds of different courses on the bachelor level, teaching students from mathematics, actuarial mathematics, mathematics-economy and physics.
In-class teaching totals approximately 400 hours.

2016/7–2016/8 **Intern**, *NIL Technology*, Lyngby, Denmark.

2014/8-2015/6 **Tutor**, *Frederiksberg Gymnasium*, Frederiksberg, Denmark.

Selected awards

2021/9 **Edlund–DMF Thesis Prize 2020**, Copenhagen, Denmark.
Prize for the best master's thesis in mathematics awarded by the Danish Mathematical Society.

2015/7 **International Physics Olympiad (IPhO) 2015**, Mumbai, India, *Bronze medallist*.
Physics competition for high-school students.

2014/11 **Young Researchers Project (Projekt Forskerspirer) 2014**, Copenhagen, Denmark, *Winner in the category of natural sciences*.
Competition for high-school students to create a research project.

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Other awards

2019/5 **PLANCKS 2019**, Odense, Denmark, *3rd place out of 34*.
Physics competition for teams of 3-4 students.

2018/5 **PLANCKS 2018**, Zagreb, Croatia, *15th place out of 31*.
Physics competition for teams of 3-4 students.

2017/5 **PLANCKS 2017**, Graz, Austria, *12th place out of 36*.
Physics competition for teams of 3-4 students.

2016/10 **the Nordic Mathematical Team Competition**, *4th place out of 15*.
Mathematics competition for teams of up to 4 students.

2016/5 **PLANCKS 2016**, Bucharest, Romania, *Participant*.
Physics competition for teams of 3-4 students.

2015/6 **Marten's memorial scholarship**, *Frederiksberg Gymnasium*, Frederiksberg, Denmark.

2015/3 **the Nordic Mathematical Contest 2015**, *Participant*.
Mathematics competition for high-school students.

2014/3 **the Nordic Mathematical Contest 2014**, *Participant*.
Mathematics competition for high-school students.

Languages

Danish Native

English Fluent

German Intermediate (level B2 on the Common European Framework of Reference for Languages)

Publications

2024 A. B. Lauritsen. "Almost Optimal Upper Bound for the Ground State Energy of a Dilute Fermi Gas via Cluster Expansion". *Ann. Henri Poincaré*.

A. B. Lauritsen and R. Seiringer. "Ground state energy of the dilute spin-polarized Fermi gas: Lower bound". arXiv:2402.17558 [math-ph].

A. B. Lauritsen and R. Seiringer. "Ground state energy of the dilute spin-polarized Fermi gas: Upper bound via cluster expansion". *J. Funct. Anal.* **286**.7, p. 110320.

A. B. Lauritsen and R. Seiringer. "Pressure of a dilute spin-polarized Fermi gas: Upper bound". arXiv:2407.05990 [math-ph].

2023 J. Henheik and A. B. Lauritsen. "Universal behavior of the BCS energy gap". arXiv:2312.11310 [cond-mat, physics:math-ph].

J. Henheik, A. B. Lauritsen, and B. Roos. "Universality in low-dimensional BCS theory". *Rev. Math. Phys.*, p. 2360005.

F. R. Klausen and A. B. Lauritsen. "Stochastic cellular automaton model of culture formation". *Phys. Rev. E* **108**.5, p. 054307.

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A. B. Lauritsen and R. Seiringer. "Pressure of a dilute spin-polarized Fermi gas: Lower bound". Forum of Mathematics, Sigma (in press), arXiv:2307.01113 [math-ph].

2022 J. Henheik and A. B. Lauritsen. "The BCS Energy Gap at High Density". *J Stat Phys* **189**.5.

2021 A. B. Lauritsen. "Floating Wigner crystal and periodic jellium configurations". *J. Math. Phys.* **62**.8, p. 083305.

A. B. Lauritsen. "The BCS energy gap at low density". *Lett. Math. Phys.* **111**.20.

Conference talks

2024/8 **Rigorous Renormalization Group Analysis of Collective Phenomena in Fermionic Quantum Systems**, Como, Italy.
Contributed poster: "Ground state energy of the dilute spin-polarized Fermi gas".

2024/8 **Quantissima in the Serenissima V**, Venice, Italy.
Contributed talk: "Universal behaviour of the BCS energy gap".

2024/7 **Current Topics in Mathematical Physics**, Zürich, Switzerland.
Contributed talk: "Ground state energy of a dilute spin-polarized Fermi gas".

2024/7 **International Congress on Mathematical Physics (ICMP)**, Strasbourg, France.
Contributed poster: "Ground state energy of the dilute spin-polarized Fermi gas".

2024/6 **3rd ISTA Summer School in Analysis and Mathematical Physics** , Klosterneuburg, Austria.
Contributed talk: "Floating Wigner Crystal and Periodic Jellium Configurations".

2023/8 **Current Topics in Mathematical Physics**, Warsaw, Poland.
Contributed talk: "Pressure of a dilute spin-polarized Fermi gas".

2023/7 **Workshop of Young Researchers in Mathematical Physics**, Westerham, Germany.
Invited talk: "Dilute Fermi gases: Upper bounds via cluster expansion".

2022/9 **QMath 15**, Davis, USA.
Contributed (online) talk: "The BCS energy gap at low and high density".

2022/8 **Quantissima in the Serenissima IV**, Venice, Italy.
Contributed talk: "Floating Wigner Crystal and Periodic Jellium Configurations".

2022/6 **Mathematical Challenges in Quantum Mechanics (MCQM22)**, Como, Italy.
Contributed talk: "BCS energy gap at low and high density".

2021/8 **International Congress on Mathematical Physics (ICMP)**, Geneva, Switzerland.
Contributed poster: "The BCS energy gap at low density".

2021/7 **Summer School on Current Topics in Mathematical Physics**, Zürich, Switzerland.
Contributed talk: "Floating Wigner Crystal and Periodic Jellium Configurations".

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Seminar talks

2024/3 **Séminaire: Problèmes Spectraux en Physique Mathématique**, Paris, France.
"Energies of dilute spin-polarized Fermi gasses"

2023/11 **MIX Colloquium**, Klosterneuburg, Austria.
General math talk: "From atoms to large quantum systems".

2023/10 **Itinerant Quantum Math Meetings**, Milan, Italy.
"Ground state energy and pressure of a dilute spin-polarized Fermi gas"

2023/6 **Mathematics of Many-Body Systems**, SISSA, Trieste, Italy.
"Energies of dilute Fermi gases: Upper bounds via cluster expansion"

2023/3 **Think & Drink**, ISTA, Klosterneuburg, Austria.
General science talk: "Modelling culture formation on the European map"

2023/2 **Quantum Lunch**, University of Copenhagen, Copenhagen, Denmark.
"Dilute Fermi gases: Upper bounds via cluster expansion"

2021/2 **Quantum Lunch**, University of Copenhagen, Copenhagen, Denmark.
Online talk: "The BCS energy gap at low density".

2020/12 **Mathematical Physics and Analysis seminar**, IST Austria, Klosterneuburg, Austria.
Online talk: "Jellium and the Uniform Electron Gas".

Klosterneuburg, 2024-09-03