Ian Jauslin
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Positions

2021–present	**Assistant Professor** at the **Department of Mathematics** of **Rutgers University** (Piscataway, New Jersey, USA).
2018–2021	**NSF Postdoctoral Fellow** (Mathematical Sciences Postdoctoral Research Fellowship) at the **Department of Physics** of **Princeton University** (Princeton, New Jersey, USA).
2016–2018	**Member** of the **School of Mathematics** at the **Institute for Advanced Study** (Princeton, New Jersey, USA).
2016	Postdoctoral appointment in the **Department of Mathematics** of the **University of Zurich** (Zurich, Switzerland).

Grants

2018–2021	**NSF** Mathematical Sciences Postdoctoral Research Fellowship, DMS-1802170.

Students Supervised

Q. He, Rutgers University, 2022-2026 (expected), jointly with J.L. Lebowitz.

Research papers

Preprints

High-fugacity expansion and crystallization in non-sliding hard-core lattice particle models without a tiling constraint ,
with Q. He,
arXiv:2402.02615

Evidence of a liquid phase in interacting Bosons at intermediate densities,
arXiv:2302.13449

The Simplified approach to the Bose gas without translation invariance,
arXiv:2302.13446

Published

Non-perturbative Solution of the 1d Schrodinger Equation Describing Photoemission from a Sommerfeld model Metal by an Oscillating Field,
with O. Costin, R. Costin, J.L. Lebowitz,
Communications in Mathematical Physics, volume 402, page 2031-2078,
doi:10.1007/s00220-023-04771-0, arXiv:2209.07570

Review of a Simplified Approach to study the Bose gas at all densities,
The Physics and Mathematics of Elliott Lieb, The 90th anniversary Volume 1, EMS Press, pages 609-635, 2022,
doi:10.4171/90-1/25, arXiv:2202.07637

Random translation-invariant Hamiltonians and their spectral gaps,
with M. Lemm,
Quantum, volume 6, page 790, 2022,
doi:10.22331/q-2022-09-01-790, arXiv:2111.06433

A simplified approach to the repulsive Bose gas from low to high densities and its numerical accuracy,
with E.A. Carlen, M. Holzmann, E.H. Lieb,
Physical Review A, volume 103, number 053309, 2021,
doi:10.1103/PhysRevA.103.053309, arXiv:2011.10869

Analysis of a simple equation for the ground state of the Bose gas II: Monotonicity, Convexity and Condensate Fraction,
with E.A. Carlen, E.H. Lieb,
SIAM Journal on Mathematical Analysis, volume 53, number 5, pages 5322-5360, 2021,
doi:10.1137/20M1376820, arXiv:2010.13882

A Theorem on Ellipses, an Integrable System and a Theorem of Boltzmann,
with G. Gallavotti,
arXiv:2008.01955 (never submitted to a journal)

On the convolution inequality $f > f * f$,
with E.A. Carlen, E.H. Lieb, M. Loss,
International Mathematics Research Notices, volume 2021, issue 24, pages 18604-18612, 2021,
doi:10.1093/imrn/rnaa350, arXiv:2002.04184

Analysis of a simple equation for the ground state energy of the Bose gas,
with E.A. Carlen, E.H. Lieb,
Pure and applied Analysis, volume 2, issue 3, pages 659-684, 2020,
doi:10.2140/paa.2020.2.659, arXiv:1912.04987

Exact solution of the Schrodinger equation for photoemission from a metal,
with O. Costin, R. Costin, J.L. Lebowitz,
Journal of Physics A: Mathematical and Theoretical, volume 53, issue 36, number 365201, 2020,
doi:10.1088/1751-8121/aba1b6, arXiv:1911.00201

Plate-Nematic phase in three dimensions,
with M. Disertori, A. Giuliani,
Communications in Mathematical Physics, volume 373, issue 1, pages 327-356, 2020,
doi:10.1007/s00220-019-03543-z, arXiv:1805.05700

Solution of the time dependent Schrodinger equation leading to Fowler-Nordheim field emission,
with O. Costin, R. Costin, J.L. Lebowitz,
Journal of Applied Physics, volume 124, number 213104, 2018,
doi:10.1063/1.5066240, arXiv:1808.00936

Liquid Crystals and the Heilmann-Lieb model,
International Association of Mathematical Physics News Bulletin, April 2018,
http://www.iamp.org/bulletins/old-bulletins/Bulletin-April2018-print.pdf

High-fugacity expansion, Lee-Yang zeros and order-disorder transitions in hard-core lattice systems,
with J.L. Lebowitz,
Communications in Mathematical Physics, volume 364, issue 2, pages 655-682, 2018,
doi:10.1007/s00220-018-3269-7, arXiv:1708.01912

Nematic liquid crystal phase in a system of interacting dimers and monomers,
with E.H. Lieb,
Communications in Mathematical Physics, volume 363, issue 3, pages 955-1002, 2018,
doi:10.1007/s00220-018-3237-2, arXiv:1709.05297

Crystalline ordering and large fugacity expansion for hard core lattice particles,
with J.L. Lebowitz,
Journal of Physical Chemistry B, volume 122, number 13, pages 3266-3271, 2018,
doi:10.1021/acs.jpcb.7b08977, arXiv:1705.02032

Topological phase transitions and universality in the Haldane-Hubbard model,
with A. Giuliani, V. Mastropietro, M. Porta,
Physical Review B, volume 94, issue 20, number 205139, 2016,
doi:10.1103/PhysRevB.94.205139, arXiv:1605.07407

A Pfaffian formula for monomer-dimer partition functions,
with A. Giuliani, E.H. Lieb,
Journal of Statistical Physics, volume 163, issue 2, pages 211-238, 2016,
doi:10.1007/s10955-016-1484-1, arXiv:1510.05027

The ground state construction of bilayer graphene,
with A. Giuliani,
Reviews in Mathematical Physics, volume 28, issue 8, number 1650018, 2016,
doi:10.1142/S0129055X16500185, arXiv:1507.06024

Kondo effect in the hierarchical s-d model,
with G. Gallavotti,
Journal of Statistical Physics, volume 161, issue 5, pages 1231-1235, 2015,
doi:10.1007/s10955-015-1370-2, arXiv:1507.05678

Kondo effect in a fermionic hierarchical model,
with G. Benfatto,
Journal of Statistical Physics, volume 161, issue 5, pages 1203-1230, 2015,
doi:10.1007/s10955-015-1378-7, arXiv:1506.04381

Mathematical Formalizations

under review: LEAN: with A. Kontorovich, *Existence of primitives for holomorphic functions on a disc*,
https://github.com/leanprover-community/mathlib4/pull/9598.

Software

Nstrophy: a tool to solve the 2D Navier Stokes equation and compare it to Gallavotti's reversible NS equation.
http://ian.jauslin.org/software/Nstrophy.

simplesolv: a tool to solve the equations in the Simplified Approach to the Bose gas numerically.
http://ian.jauslin.org/software/simplesolv.

libinum: a C library for high-precision numerical computations
http://ian.jauslin.org/software/libinum.

meankondo: a tool to compute and manipulate flow equations for Fermionic hierarchical models
http://ian.jauslin.org/software/meankondo.

Conference talks

Invited speaker at the *125th Statistical Mechanics Meeting* at Rutgers University, December 2023

Invited speaker at *Condensed Matter Theory Fall Symposium* at Rutgers University, September 2023

Invited speaker at *Advances in Classical, Quantum and Statistical Mechanics - A celebration of the work and contributions of Giovanni Gallavotti* in Rome, Italy, May 2022

Invited speaker at the online conference *Uniqueness methods in Statistical Mechanics*, December 2020

Invited speaker at the *TX-LA Sectional Meeting of SIAM* mini-symposium *Spectral Theory and Mathematical Physics*, October 2020

Invited speaker at the *AMS Fall Sectional Meeting* Special Session *Recent Probabilistic Advances in Mathematical Physics*, October 2020

Invited participant at the *Oberwolfach Workshop 41-2019* in Oberwolfach, Germany, September 2019

Contributed talk at the *Great Lake Mathematical Physics Meeting* in Oberlin, Ohio, USA, June 2019

Invited speaker at *Mathematical Physics at the Crossings* in VirginiaTech, Virginia, USA, May 2019

Invited speaker at the *121st Statistical Mechanics Meeting* in Rutgers, New Jersey, USA, May 2019

Contributed talk at the *International Congress on Mathematical Physics* in Montreal, Quebec, Canada, July 2018

Invited speaker at the *Conference celebrating Elliott Lieb's work* in Princeton University, New Jersey, USA, April 2018

Contributed talk at *Mathematical Challenges in Quantum Mechanics* in Rome, Italy, February 2018

Invited speaker at the *118th Statistical Mechanics Meeting* in Rutgers, New Jersey, USA, December 2017

Plenary speaker at the *Great Lakes Mathematical Physics Metting 2017* in East Lansing, Michigan, USA, June 2017

Contributed talk at the *117th Statistical Mechanics Meeting* in Rutgers, New Jersey, USA, May 2017

Invited speaker at *Qmath 13* in GeorgiaTech, Atlanta, Georgia, USA, October 2016.

Invited speaker at the *Oberwolfach workshop 1637* in Oberwolfach, Germany, September 2016.

Invited participant at the *Oberwolfach workshop 1630* in Oberwolfach, Germany, July 2016.

Contributed talk at the *XVIII International Congress of Mathematical Physics* Santiago, Chile, July 2015.

Invited speaker at *Trails in Quantum Mechanics and Surroundings* Como, Italy, July 2015.

Contributed talk at the *112th Statistical Mechanics Meeting* in Rutgers, New Jersey, USA, December 2014

Seminar talks

Princeton University, New Jersey, USA, February 2024

University of Warsaw, Poland, January 2024

GSSI, L'Aquila, Italy, January 2024

UC Davis, California, May 2023

Princeton University, Princeton, New Jersey, April 2023

SISSA, Trieste, Italy, March 2023

Rutgers University, New Brunswick, New Jersey, March 2023

Rutgers University, New Brunswick, New Jersey, February 2023

University of Milan, Italy, February 2022

University of Tübingen, Germany, January 2022

Ludwig Maximilian University, Munich, Germany, April 2021

Yeshiva University, New York, New York, USA, April 2021

Jacobs University, Bremen, Germany, April 2021

Penn State, University Park, Pennsylvania, USA, March 2021

Institute for Advanced Study, Princeton, New Jersey, USA, March 2021

University of Copenhagen, Denmark, January 2021

Rutgers University, New Brunswick, New Jersey, USA, December 2020

Texas A&M, College Station, Texas, USA, November 2020

International Association of Mathematical Physics - One World Seminars (online), September 2020

Harvard University, Cambridge, Massachusetts, USA, August 2020

Texas A&M, College Station, Texas, USA, May 2020

Harvard University, Cambridge, Massachusetts, USA, April 2020

Harvard University, Cambridge, Massachusetts, USA, March 2020

University of Toronto, Ontario, Canada, March 2020

Princeton University, New Jersey, USA, March 2020

VirginiaTech, Blacksburg, Virginia, USA, February 2020

UC Davis, California, USA, February 2020

GeorgiaTech, Atlanta, Georgia, USA, January 2020

University of British Columbia, Vancouver, British Columbia, Canada, January 2020

Michigan State University, East Lansing, Michigan, USA, May 2019

GeorgiaTech, Atlanta, Georgia, USA, Feb 2019

Princeton University, New Jersey, USA, Nov 2018

Yale University, New Haven, Connecticut, USA, Oct 2018

Harvard University, Boston, Massachusetts, USA, Oct 2018

Rutgers University, New Jersey, USA, Sep 2018

VirginiaTech, Virginia, USA, Mar 2018

Princeton University, New Jersey, USA, Feb 2018

GeorgiaTech, Atlanta, Georgia, USA, Nov 2017

Institute for Advanced Study, Princeton, New Jersey, USA, Oct 2017

Rutgers University, Princeton, New Jersey, USA, Oct 2017

Institute for Advanced Study, Princeton, New Jersey, USA, Oct 2017

Institute for Advanced Study, Princeton, New Jersey, USA, Sep 2017

Princeton University, New Jersey, USA, Mar 2017

Rutgers University, USA, Sep 2016

Institute for Advanced Study, Princeton, USA, Sep 2016

University of Zurich, Switzerland, Mar 2016

Copenhagen University, Denmark, Jan 2016

Rutgers University, USA, Sep 2015

Schools

Invited lecturer at the TXST summer school 2023 at Texas State University, San Marcos, Texas, July 2023

Invited lecturer at GSSI, L'Aquila, Italy, March 2023

Invited lecturer at the summer school *Quantum Mechanics from Condensed Matter to Computing* in Copenhagen, Denmark, June 2022

Service

Conferences

I have assisted in the organization of a number of Statistical Mechanics Meetings at Rutgers University, specifically SMM 112, 114, and 116 through 125, held between 2014 and 2023.

2024-present

Editor of the International Association of Mathematical Physics Bulletin.

2023-present

Co-Organizer of the International Association of Mathematical Physics One-World (online) seminar.

2017-2018

Co-organizer of the seminar series *Mathematical conversations* at the Institute for Advanced Study.

Refereeing

Communications in Mathematical Physics,
Continuum Mechanics and Thermodynamics,
International Journal of Modern Physics B,
Journal of Mathematical Physics,
Journal of Physics A,
Journal of Statistical Physics,
Mathematical Physics, Analysis and Geometry,
Physical Review E,
Physical Review X,
Physical Review Research,
Probability Theory and Related Fields,
Reports on Mathematical Physics,
SIAM Journal on Applied Dynamical Systems.

Science outreach

Talks

Statistical Mechanics: from the microscopic to the Macroscopic, RUMA, Rutgers University, New Jersey, USA, October 2022.

Statistical Mechanics: from microscopic to Macroscopic, Glimpse talk, Rutgers University, New Jersey, USA, August 2022.

Liquid crystals: order upon disorder, Celebrating Ideas 2017-18, Institute for Advanced Study, Princeton, New Jersey, USA, April 2018.

Liquid crystals and the Heilmann-Lieb conjecture, Lunch with a Member, Institute for Advanced Study, Princeton, New Jersey, USA, April 2018.

Liquid crystals and the Heilmann-Lieb conjecture, Staff breakfast, Institute for Advanced Study, Princeton, New Jersey, USA, September 2017.

Mathematics and Music: Vibrating strings and overtones, Lunch with a Member, Institute for Advanced Study, Princeton, New Jersey, USA, March 2017.

Publications

Liquid crystals and the Heilmann-Lieb conjecture
The Institute Letter, Fall 2017 issue
https://www.ias.edu/ideas/2017/jauslin-liquid-crystals.

Youtube

Channel: @ianjauslin9430

Entropy and Irreversibility, October 2023,
https://www.youtube.com/watch?v=VqQb5qaUtAs

A proof of Bells' inequality, December 2022,
https://www.youtube.com/watch?v=hZX7wUdFSOQ

Non-Locality, the Einstein-Podolsky-Rosen argument, and Bell's inequality, November 2022,
https://www.youtube.com/watch?v=Y9hBBdaZUHc

Podcast Interviewed for Místo Problémů, September 2023,
https://www.mistoproblemu.cz/e/27-ian-jauslin....

Other publications

A Continuing Engagement with Endangered and Excluded Scholars
with A. Crary, J. Heilbron,
The Institute Letter, Spring 2019 issue

The Institute's founding ethos in our precarious present; *Einstein, plumbers and McCarthyism*; *Emmy Noether's Paradise*
with F. Bardawil, T. Dodman, P. Marichalar, K. Oschema, P. Redfield, (History Working Group),
The Institute Letter, Spring 2017 issue
Notices of the AMS, volume 64, issue 10, November 2017,
doi: 10.1090/noti1596.

Teaching experience

Rutgers University, Mathematics department

spring 2024 **Graduate course**: 562: Introduction to Mathematical Physics II: Quantum Mechanics.

spring 2024 **Undergraduate course**: 477: Mathematical Theory of Probability.

fall 2023 **Undergraduate course**: 291: Honors track Calculus III.

spring 2023 **Undergraduate course**: 292: Honors track Calculus IV.

fall 2022 **Graduate course**: 561: Introduction to Mathematical Physics I, Classical Mechanics.

spring 2022 **Undergraduate course**: 292: Honors track Calculus IV.

fall 2021 **Undergraduate course**: 291: Honors track Calculus III.

Princeton University, Physics department

spring 2021 **Undergraduate course**: PHY 106 Electromagnetism.

fall 2020 **Graduate course**: PHY 504/514 Electromagnetism and Statistical Physics: Principles and Problem solving.

spring 2020 **Lecturer** for a section of PHY102 Introductory Physics 2.

fall 2019 **Lecturer** for a section of PHY103 General Physics 1.

_____	**University of Zurich**, Mathematics department
2016	**Exercise classes** for an undergraduate (third year) course in mathematical physics (1 semester).
_____	**Università degli studi di Roma Tre**, Mathematics and Physics department
2013-2014	**Exercise classes** for an undergraduate (third year) course in mathematical physics (2 semesters).

Education

2012–2016	**PhD** in **Physics** at the **Università degli studi di Roma "La Sapienza"** (Rome, Italy) under the supervision of **Alessandro Giuliani**.
2010–2012	**Master's degree in Physics** with a major in Quantum Physics at the **Ecole Normale Supérieure de Paris** (France).
2009–2010	**Bachelor's degree in Physics** at the **Ecole Normale Supérieure de Paris** (France).
2007–2009	**Classes Préparatoires aux Grandes Ecoles MPSI-MP*** at Lycée Carnot Dijon, France (equivalent to the first two years of university, preparing the admission exams to higher-education schools).

Computer skills

I am proficient in LaTeX and plain TeX, and am comfortable with the version control system **git**.

I have been using Linux-based operating systems on a daily basis since 2013, and run **Arch Linux** on my personal computer and my server. Before switching to Linux, I ran **Mac OS X**.

I have written software in **C**, **python**, **bash**, **C++**, **fortran** and **Objective-C**, and am proficient in using Unix-like command line interfaces.

I am also proficient in the **julia** language, which is designed for scientific numerical computations.

I am also proficient with the proof formalization language **LEAN**.

I have used the **SciPy** and **NumPy** modules, as well as **Maxima** and **Mathematica** for research purposes.

I am also proficient in web design, and am comfortable with **HTML5**, **javascript**, **php** and **SQL**.

I have been running and maintaining a server since 2012, on which I host a website (using **apache httpd** and **postgresql**), run an email server (**postfix** and **dovecot**), as well as a variety of web services, including DNS (**bind**), and XMPP (**ejabberd**) servers.

Languages

English:	native language
French:	native language
Spanish:	fluent
Italian:	fluent
German:	school level (7 years)