Carlo Vanoni

Curriculum Vitae

Personal Data

Place of Birth	Varese, VA, Italy
Date of Birth	31/01/1996
E-mail	cvanoni@sissa.it
Work Addresses	Via Bonomea 265, c/o SISSA, TS, Italy, 34136 – Office 301 (Building A)
	Str. Costiera, 11, c/o ICTP, TS, Italy, 34151 – Office 305 (Leonardo Building)
	Google Scholar link
	Linkedin link

Education

Fall 2020–(now)	**PhD in Statistical Physics**, *International School for Advanced Studies (SISSA)*, Trieste, *Supervisors*: Andrea Gambassi and Antonello Scardicchio
Fall 2018–Fall 2020	**Master's Degree in Theoretical Physics**, *Università degli Studi di Milano*, Milan, *Grade – 110 cum laude/110*
Fall 2015–Fall 2018	**Bachelor's Degree in Physics**, *Università degli Studi di Milano*, Milan, *Grade – 110 cum laude/110*
2010–2015	**High School**, *Liceo Scientifico M. Curie*, Tradate, *Grade – 90/100*

PhD Project

Title	*Out-of-equilibrium dynamics and ergodicity breaking in many-body quantum systems*
Supervisors	Andrea Gambassi and Antonello Scardicchio

Master's Thesis

Title	*Localization and ergodicity in the Discrete Non-Linear Schrödinger Equation*
Supervisors	Sergio Caracciolo and Antonello Scardicchio

Bachelor's Thesis

Title *Monopartite Euclidean Travelling Salesman Problem in one dimension*

Supervisor Sergio Caracciolo

Research Interests

- ○ Out-of-equilibrium dynamics in quantum systems
- ○ Localization in disordered quantum systems
- ○ Ergodicity breaking in classical and quantum systems
- ○ Two-dimensional quantum spin lattice models

Awards and Scientific Competitions

2023 Italian Physical Society "Augusto Righi" Prize for Scientific Achievements

2015 Bronze Medal at the national level of the Italian Physics Olympics

2014 Winner of the Valerio Filippini Physics Prize

2014 Scientific preparation for the Italian team at the International Physics Olympiads (IPhO) at ICTP

2014 Participant at the national level of the Italian Physics Olympiads

Publications

[1] **Renormalization Group Analysis of the Anderson Model on Random Regular Graphs**
C Vanoni, B L Altshuler, V E Kravtsov, A Scardicchio
(2023) arXiv:2306.14965.

[2] **A hydrodynamic approach to Stark localization**
L Capizzi, C Vanoni, P Calabrese, A Gambassi
(2023) J. Stat. Mech. (2023) 073104.

[3] **Interface dynamics in the two-dimensional quantum Ising model**
F Balducci, A Gambassi, A Lerose, A Scardicchio, C Vanoni
(2023) Phys. Rev. B 107, 024306.

[4] **Slow melting of a disordered quantum crystal**
F Balducci, A Scardicchio, C Vanoni
(2023) Phys. Rev. B 107, 024201.

[5] **Localization and melting of interfaces in the two-dimensional quantum Ising model**
F Balducci, A Gambassi, A Lerose, A Scardicchio, C Vanoni
(2022) Phys. Rev. Lett. 129, 120601.

[6] **Localization in the Discrete Non-Linear Schrödinger Equation and geometric properties of the microcanonical surface**
C Arezzo, F Balducci, R Piergallini, A Scardicchio, C Vanoni
(2022) J. Stat. Phys. 186 (2), 1-23.

[7] **Average optimal cost for the Euclidean TSP in one dimension**
S Caracciolo, A Di Gioacchino, EM Malatesta, C Vanoni
(2019) J. Phys. A: Math. Theor. 52 (26), 264003.

Contributed Seminars and Presentations

May 2023	**Short talk at the 124th Conference on Statistical Mechanics**, *Rutgers University - New Brunswick, NJ*
May 2023	**Seminar at the Condensed Matter Theory Group**, *Boston University - Boston, MA*
December 2022	**Speaker at the 8th Trieste–Ljubljana-Zagreb meeting**, *ICTP - Trieste*
August - September 2022	**Poster presentation at Quantum Dynamics: From Electrons to Qbits**, *ICTP - Trieste*
June 2022	**Poster presentation at II Conference of the Italian Society of Statistical Physics - SIFS**, *University of Parma*
March 2022	**Poster presentation at StatPHYS Kolkata XI**, *Online*
June 2021	**Poster and short talk at I Conference of the Italian Society of Statistical Physics - SIFS**, *Online*

Conference Organization

October 2022	**(Local) Organizer of the Conference The Many Facets of Statistical Field Theory**, A conference in honour of Sergio Caracciolo's 70th birthday, SISSA - Trieste, October 17-19
Links: Conference website, YouTube channel with recordings of the talks

Visitings and list of attended schools and conferences

2023	**Boulder Summer School: Non-Equilibrium Quantum Dynamics**, *University of Colorado*, Boulder, Colorado
Jul 2023
2023	**Visiting**, (1 week) Physics Department (prof. David A. Huse and Sarang Gopalakrishnan), Princeton University, Princeton, New Jersey
Jun 2023
2023	**Visiting**, (2 months) Condensed Matter Theory Group (prof. Anushya Chandran), Boston University, Boston, Massachusetts
Apr-Jun 2023
2022	**Ergodicity breaking and integrability in long-range systems and on random graphs**, Nordic Institute for Theoretical Physics, Stockholm, Sweden
Nov 2022
2022	**Frontiers of quantum condensed matter physics: light, matter, and unusual devices out of equilibrium (FQCMP2022)**, Graduate centre, City University of New York, New York
Nov 2022

2022 **Quantum Dynamics: From Electrons to Qbits**, ICTP Trieste, Italy
Aug - Sept 2022

2022 **The Beg Rohu Summer School - Non Equilibrium Dynamics**, Saint-Pierre Quiberon, France
Jun 2022

2022 **StatPHYS Kolkata XI**, Online
Mar 2022

2022 **GGI Winter School in Statistical Field Theory**, *GGI - Florence*, Online
Feb 2022

2022 **Second Adriatic Conference on Strongly Correlated Systems**, *ICTP*, Online
Feb 2022

2021 **Ergodicity Breaking and Anomalous Transport in Quantum Many-Body Systems**, *Max Planck Institute for the Physics of Complex Systems*, Online
Oct 2021

2021 **Statistical and Quantum Mechanics**, *Gran Sasso Science Institute*, Online
Sep 2021

2021 **The Hitchhiker's Guide to Condensed Matter and Statistical Physics: Topological Phenomena in Condensed Matter**, *ICTP*, Online
May - Jun 2021

2021 **GGI Winter School in Statistical Field Theory**, *GGI - Florence*, Online
Feb 2021

2018 **Disordered Serendipity: a Glassy Path to Discover. A workshop in honour of Giorgio Parisi's 70th birthday**, *Univeristy of Rome - La Sapienza*, Roma, Italy
Sep 2018

2014 **Operational Issues in Radioactive Waste Management and Nuclear Decommissioning EUROPEAN COMMISSION**, *Joint Research Centre*, Ispra, Italy
Sep 2014

2014 **Ad un passo dalle IPhO 2014 (preparation school for the International Physics Olympiad)**, *ICTP*, Trieste, Italy
May 2014

2014 **Quantum Mechanics and Measure of Planck's constant**, *INFN Laboratories*, Frascati, Italy
Jun 2014

Scientific journals

Since 2022 **Referee for SciPost**

Scientific Societies and Institutions

Italian Physical Society, *SIF*
Italian Society for Statistical Physics, *SIFS*

National Institute for Nuclear Physics, *INFN*

Teaching, Divulgative and Management Activity

2023-2024 **Students' representative for the Statistical Physics group**, *SISSA*

2023 **Master's thesis co-supervision**, *Giulia Tranquillini (University of Trieste) - Entanglement and Robustness of the Quantum Fourier Transform in Shor's Algorithm*, Principal supervisors: Antonello Scardicchio and Fabio Benatti

2023 **Website management for the Statistical Physics Group**, *SISSA*, (50 h)

2022 **Website management for the Statistical Physics Group**, *SISSA*, (75 h)

2019 **Lesson on Electromagnetism**, *Liceo Scientifico Viale dei Tigli*, Gallarate, VA, Italy
Preparation course for the second level competition of the Physics Olympics

2018 **Lesson on Electromagnetism**, *Liceo Scientifico Viale dei Tigli*, Gallarate, VA, Italy
Preparation course for the second level competition of the Physics Olympics

2017 **Lesson on Classical Mechanics**, *Liceo Scientifico Viale dei Tigli*, Gallarate, VA, Italy
Preparation course for the second level competition of the Physics Olympics

2016 **Lesson on Classical Mechanics**, *Liceo Scientifico Viale dei Tigli*, Gallarate, VA, Italy
Preparation course for the second level competition of the Physics Olympics

Computer skills

Basic HTML

Intermediate Mathematica

Advanced C++, Python, LaTeX, Linux

List of Exams

(The exams are listed in chronological order of execution)

Bachelors

30L/30	Meccanica - Classical Mechanics
29/30	Analisi Matematica 1 - Calculus I
30/30	Informatica - Computer programming I
30L/30	Laboratorio di Fisica con Elementi di statistica - Experimental Physics with Elements of Statistics
30L/30	Onde e Oscillazioni - Wave and Light theory
30L/30	Geometria 1 - Geometry I
26/30	Analisi Matematica 2 - Calculus II
30L/30	Analisi Matematica 3 - Calculus III
28/30	Laboratorio di Trattamento Numerico dei Dati Sperimentali - Computer programming II
30/30	Meccanica Analitica - Analytical Mechanics
30L/30	Elettromagnetismo - Electromagnetism
30/30	Laboratorio di Ottica, Elettronica e Fisica Moderna - Experimental Physics (Optics, Electronics and Modern Physics)
30/30	Metodi Matematici della Fisica - Mathematical Methods for Physics
30/30	Termodinamica - Thermodynamics
30L/30	Fisica Moderna e Meccanica Quantistica - Quantum Mechanics I and II
30L/30	Metodi Matematici della Fisica - Geometria e Gruppi - Group Theory
30L/30	Introduzione alla Relatività Generale - Introduction to General Relativity
27/30	Istituzioni di Fisica Nucleare e Subnucleare - Introduction to Nuclear and Subnuclear Physics
27/30	Chimica 1 - Chemistry I
27/30	Struttura della Materia I - Physics of Matter I
30L/30	Analisi Matematica 4 - Calculus IV

Masters

30L/30	Teoria dei Sistemi a Molti Corpi 1 - Quantum Many-Body Theory I
30L/30	Teoria Quantistica dell'Informazione. Quantum Information Theory
30L/30	Teoria dei Sistemi a Molti Corpi 2 - Quantum Many-Body Theory II
30L/30	Fisica Teorica 1 - Quantum Field Theory I
30L/30	Meccanica Statistica 2 - Statistical Mechanics II
30L/30	Fisica Statistica Avanzata - Advanced Statistical Physics
30/30	Elettrodinamica Classica - Classical Electrodynamics
30L/30	Astronomia 1 - Astronomy I
30/30	Fisica Teorica 2 - Quantum Field Theory II

28/30   Teoria Quantistica della Computazione - Quantum Computation Theory
30L/30   Teoria delle Interazioni Fondamentali 2 - Theory of Fundamental Interactions II
30/30   Gravità e Superstringhe 2 - Supersymmetry and String Theory

PhD

30L/30   Stochastic Dynamics in Statistical Physics
30/30   Field Theory of Critical Phenomena
30L/30   Introduction to General Relativity
30L/30   Introduction to Holography
30L/30   Statistical Field Theory
29/30   Entanglement Entropy and Quantum Field Theories
30L/30   Introduction to Random Matrices
30L/30   Disordered Systems
30L/30   Properties of Long-Range Interacting Systems