

UNIVERSITÀ DEGLI STUDI DI MILANO

Procedura di selezione per la chiamata a professore di II fascia da ricoprire ai sensi dell'art. 18, commi 1 e 4, della Legge n. 240/2010 per il settore concorsuale 02/B2, (settore scientifico-disciplinare FIS/03) presso il Dipartimento di Fisica, Codice concorso 4584

**[Luca Fausto Tocchio]
CURRICULUM VITAE**

(N.B. IL CURRICULUM NON DEVE ECCEDERE LE 30 PAGINE E DEVE CONTENERE TUTTI GLI ELEMENTI UTILI ALLA VALUTAZIONE DEI TITOLI SOTTOPOSTI AL GIUDIZIO DELLA COMMISSIONE)

INFORMAZIONI PERSONALI (NON INSERIRE INDIRIZZO PRIVATO E TELEFONO FISSO O CELLULARE)

COGNOME	TOCCHIO
NOME	LUCA FAUSTO
DATA DI NASCITA	19/01/1981

TITOLI

TITOLO DI STUDIO

(indicare la Laurea conseguita inserendo titolo, Ateneo, data di conseguimento, ecc.)

Nov 1999 - Jul 2004: Laurea (Master of Science) in Physics, University of Genova, (Italy).
Thesis: "Spin effects in the shot noise of a quantum dot", discussed on the 15th July 2004.
Supervisors: Prof. Maura Sassetti and Prof. Franco Napoli.
Final grade: 110/110 cum laude

TITOLO DI DOTTORE DI RICERCA O EQUIVALENTI, OVVERO, PER I SETTORI INTERESSATI, DEL DIPLOMA DI SPECIALIZZAZIONE MEDICA O EQUIVALENTE, CONSEGUITO IN ITALIA O ALL'ESTERO

(inserire titolo, ente, data di conseguimento, ecc.)

Nov 2004 - Oct 2008: Ph.D. in Theoretical Condensed Matter Physics, International School for Advanced Studies (SISSA), Trieste (Italy).
Thesis: "A new variational wave function with backflow correlations for frustrated Hubbard models", discussed on the 24th October 2008.
(available online at <http://www.sissa.it/cm/phdsection/alumni.php>)
Supervisors: Prof. Sandro Sorella and Dr. Federico Becca.
Referee: Prof. Peter Prelovšek (University of Ljubljana)

ALTRI TITOLI CONSEGUITI

(inserire titolo, ente, data di conseguimento, ecc.)

-) Italian habilitation for the position of Associate Professor in Theoretical Condensed Matter Physics (settore concorsuale 02/B2), obtained on 08/08/2018.

-) French qualification for the position of Maître de Conférence in the section 28 "Condensed Matter Physics", obtained in 2013

- 16/11/2019 - present: Tenure-track assistant professor (Ricercatore a tempo determinato Legge 240/10 art.24-B) in Theoretical Condensed Matter Physics, Department of Applied Science and Technology (DISAT) at Politecnico di Torino (Italy).
- 09/01/2017 - 15/11/2019: Assistant professor with no tenure track (Ricercatore a tempo determinato Legge 240/10 art.24-A) in Theoretical Condensed Matter Physics, Department of Applied Science and Technology (DISAT) at Politecnico di Torino (Italy).
- 01/11/2013 - 08/01/2017: PostDoc (Assegnista di Ricerca Legge 240/10 art.22) in the group of Prof. Sandro Sorella and Dr. Federico Becca, International School for Advanced Studies (SISSA), Italy. The period Nov 2013 - Oct 2015 was financed by the research project: "PRIN 2010-2011: Fenomeni quantistici collettivi: dai sistemi fortemente correlati ai simulatori quantistici".
- 01/07/2011 - 31/10/2013: PostDoc (Wissenschaftlicher Mitarbeiter) in the group of Prof. Claudius Gros and Prof. Roser Valentí, University of Frankfurt, Germany. Financed by the research project: "SFB/TR 49: Condensed Matter Systems with Variable Many-Body Interactions", second funding period (after positive evaluation of a referral committee).
- 01/12/2008 - 30/06/2011: PostDoc (Wissenschaftlicher Mitarbeiter) in the group of Prof. Claudius Gros and Prof. Roser Valentí, University of Frankfurt, Germany. Financed by the research project: "SFB/TR 49: Condensed Matter Systems with Variable Many-Body Interactions", first funding period.

ATTIVITÀ DIDATTICA

INSEGNAMENTI E MODULI

(inserire anno accademico, corso laurea, numero di ore frontali, eventuale CFU)

@University of Frankfurt:

- Tutor and responsible of exercise preparation for the course "Introduction to Solid State Physics" for the master degree in Physics (WS 2011/12 and WS 2010/11)
- Tutor and responsible of exercise preparation for the course "Advanced Solid State Physics" for the master degree in Physics (SS 2011 and SS 2009)
- Tutor for the course "Quantum Mechanics I" for the bachelor degree in Physics (SS 2013)
- Tutor for the course "Quantum Mechanics II" for the bachelor degree in Physics (SS 2010)
- Tutor for the course "Electromagnetism" for the bachelor degree in Physics (WS 2009/2010)

@SISSA, Trieste:

- Tutor for the week on Monte Carlo methods in the "Summer School on Atomistic Simulation Techniques for Material Science, Nanotechnology, and Biophysics"; 30 June - 4 July 2014, 6 - 10 July 2015, 11 - 15 July 2016

@Politecnico di Torino:

- Attendance of a training course on university teaching: "Apprendere ad Insegnare nell'Higher Education - Percorso Formativo Junior Faculty Learning", February-June 2017 (con rilascio di certificazione a termine corso)

- Lecturer for the guidance project to STEM academic disciplines: “Progetto orientamento formativo - Lezioni di Matematica e Fisica”, provided by Politecnico di Torino for high-school students (17 November 2018, 16 November 2019, and 28 November 2020)
- Recitations (Esercitazioni) (18 hours) and laboratory tutoring (30 hours) in the course “Classical Physics I: Mechanics and thermodynamics” for the first common year of bachelor degrees in Engineering (2nd semester a.y. 2016/2017)
- Recitations (Esercitazioni) (30 hours) and member of the examination committee in the course “Classical Physics II: Electromagnetism” for the bachelor degree in Mechanical Engineering (1 st semester a.y.'s 2017/2018, 2018/2019, 2019/2020, and 2020/2021)
- Lecturer and member of the examination committee in the course “Condensed Matter Theory” for the Master degree in “Physics of Complex Systems” (Module on Quantum Monte Carlo (9 hours) in the 2nd semester a.y. 2018/2019; Recitations (Esercitazioni) on lattices, band theory and phonons, as well as a module on Quantum Monte Carlo in the 2nd semester a.y. 2019/2020 (12+ 12 hours) and a.y. 2020/2021 (19.5+9 hours).
- Lecturer for the Ph.D. course “Quantum Monte Carlo methods for strongly correlated systems” (March 2018) (20 hours, shared with Dr. Federico Becca)

ATTIVITÀ DI DIDATTICA INTEGRATIVA E DI SERVIZIO AGLI STUDENTI

ATTIVITÀ DI RELATORE DI ELABORATI DI LAUREA, DI TESI DI LAUREA MAGISTRALE, DI TESI DI DOTTORATO E DI TESI DI SPECIALIZZAZIONE

(inserire anno accademico, ateneo, corso laurea, ecc.)

@University of Frankfurt:

-) Unofficial co-advisor (with Prof. Roser Valentí) of three bachelor theses:

- Robert Rüger: “Monte-Carlo methods in Statistical Physics and their Application to the Simulation of Spin systems”, 2011
- Steffi Hartmann: “Superconductivity, from the perspective of a bachelor student”, 2011
- Wiebke Ritter: “The Monte Carlo method and its application to the Ising model”, 2012

-) Unofficial co-advisor (with Prof. Roser Valentí) of a master thesis:

- Robert Rüger: “Implementation of the Variational Monte Carlo method for the Hubbard model”, 2013

@SISSA, Trieste:

-) Supervisor (with Dr. Federico Becca) of the Ph.D. thesis of Caterina De Franco. Title: “Magnetism and Superconductivity in the Two-Band Hubbard Model: A Variational Monte Carlo Perspective”. Date of defense: 26/10/2018

@Politecnico di Torino:

-) Supervisor (with Prof. Roberto Tateo) of the master thesis of Vito Marino. Title: “Competition and interplay between stripe order and superconductivity in cuprate superconductors”. Date of defense: 14/04/2021.

SEMINARI

(inserire titolo del seminario, luogo, data, ecc.)

Invited seminars at universities:

University of Frankfurt (Germany), July 2018;
Politecnico di Torino (Italy), July 2016;
University of Milan (Italy), May 2016;
Royal Holloway University of London (UK), April 2016;
IRSAMC, Toulouse (France), December 2015;
University of Frankfurt (Germany), April 2015;
Institut Jožef Stefan, Ljubljana (Slovenia), March 2015;
Institut Néel, Grenoble (France), October 2014;
University of Paris VI (France), April 2013;
University of Marburg (Germany), November 2012;
University of Frankfurt (Germany), October 2008;
University of Würzburg (Germany), July 2008;
École Normale Supérieure, Lyon (France), June 2008;
University of Genova (Italy), June 2008.

ATTIVITÀ DI RICERCA SCIENTIFICA

PUBBLICAZIONI SCIENTIFICHE

(per ciascuna pubblicazione indicare: nomi degli autori, titolo completo, casa editrice, data e luogo di pubblicazione, codice ISBN, ISSN, DOI o altro equivalente)

Note: “*” = corresponding author

(27) L.F. Tocchio*, A. Montorsi, and F. Becca, “The Hubbard model on triangular N -leg cylinders: chiral and non-chiral spin liquids”, arXiv:2105.00920.

(26) L.F. Tocchio*, A. Montorsi, and F. Becca, “Magnetic and spin-liquid phases in the frustrated t - t' Hubbard model on the triangular lattice, Phys. Rev. B 102, 115150 (2020).

(25) L.F. Tocchio*, A. Montorsi, and F. Becca, “Metallic and insulating stripes and their relation with superconductivity in the doped Hubbard model”, SciPost Phys. 7, 021 (2019).

(24) W.-J. Hu, H. Hu, R. Yu, H.-H. Lai, L.F. Tocchio, F. Becca, and Q. Si, “Nematic and Antiferromagnetic Quantum Criticality in a Multi-Orbital Hubbard Model for Iron Pnictides”, arXiv: 1903.12625.

(23) L.F. Tocchio*, F. Becca, and A. Montorsi, “Superconductivity in the Hubbard model: a hidden-order diagnostics from the Luther-Emery phase on ladders”, SciPost Phys. 6, 018 (2019).

(22) C. De Franco, L.F. Tocchio*, and F. Becca, “Metal-insulator transitions, superconductivity, and magnetism in the two-band Hubbard model”, Phys. Rev. B 98, 075117 (2018).

(21) S. Karakuzu, L.F. Tocchio*, S. Sorella, and F. Becca, “Superconductivity, charge-density waves, and antiferromagnetism in the Hubbard-Holstein model”, Phys. Rev. B 96, 205145 (2017).

(20) R. Kaneko, L.F. Tocchio*, R. Valentí, and F. Becca, “Charge orders in organic charge-transfer salts”, New J. Phys. 19, 103033 (2017).

- (19) L.F. Tocchio*, F. Becca, and S. Sorella, "Hidden Mott transition and large- U superconductivity in the two-dimensional Hubbard model", Phys. Rev. B 94, 195126 (2016).
- (18) R. Kaneko, L.F. Tocchio, R. Valentí, and C. Gros, "Emergent lattices with geometrical frustration in doped extended Hubbard models", Phys. Rev. B 94, 195111 (2016).
- (17) R. Kaneko, L.F. Tocchio, R. Valentí, F. Becca, and C. Gros, "Spontaneous symmetry breaking in correlated wave functions", Phys. Rev. B 93, 125127 (2016).
- (16) L.F. Tocchio*, F. Arrigoni, S. Sorella, and F. Becca, "Assessing the orbital selective Mott transition with variational wave functions", J. Phys.: Condens. Matter 28, 105602 (2016).
- (15) E. Ghorbani, L.F. Tocchio*, and F. Becca, "Variational wave functions for the $S = 1/2$ Heisenberg model on the anisotropic triangular lattice: spin liquids and spiral orders", Phys. Rev. B 93, 085111 (2016); **Editors' Suggestion**.
- (14) J.P.F. LeBlanc et al. (Simons Collaboration on the Many-Electron Problem), "Solutions of the Two Dimensional Hubbard Model: Benchmarks and Results from a Wide Range of Numerical Algorithms", Phys. Rev. X 5, 041041 (2015); **Highly Cited Paper in Web of Science**.
- (13) L.F. Tocchio, C. Gros, X.-F. Zhang, and S. Eggert, "Phase diagram of the triangular extended Hubbard model", Phys. Rev. Lett. 113, 246405 (2014).
- (12) L.F. Tocchio*, C. Gros, R. Valentí, and F. Becca, "One-dimensional spin liquid, collinear, and spiral phases from uncoupled chains to the triangular lattice", Phys. Rev. B 89, 235107 (2014).
- (11) R. Rüger, L.F. Tocchio*, R. Valentí, and C. Gros, "Phase diagram of the square lattice bilayer Hubbard model: A variational Monte Carlo study", New. J. Phys. 16 033010 (2014).
- (10) A.C. Jacko, L.F. Tocchio, H.O. Jeschke, and R. Valentí, "Importance of anisotropy in the spin-liquid candidate $\text{Me}_3\text{EtSb}[\text{Pd}(\text{dmit})_2]_2$ ", Phys. Rev. B 88, 155139 (2013).
- (9) L.F. Tocchio*, H. Feldner, F. Becca, R. Valentí and C. Gros, "Spin-liquid versus spiral-order phases in the anisotropic triangular lattice", Phys. Rev. B 87, 035143 (2013).
- (8) L.F. Tocchio*, H. Lee, H.O. Jeschke, R. Valentí and C. Gros, "Mott correlated states in the underdoped two-dimensional Hubbard model: variational Monte Carlo versus a dynamical cluster approximation", Phys. Rev. B 87, 045111 (2013).
- (7) L.F. Tocchio*, F. Becca and C. Gros, "Strong renormalization of the Fermi-surface topology close to the Mott transition", Phys. Rev. B 86, 035102 (2012).
- (6) L.F. Tocchio, F. Becca and C. Gros, "Backflow correlations in the Hubbard model: An efficient tool for the study of the metal-insulator transition and the large- U limit", Phys. Rev. B 83, 195138 (2011).
- (5) A. Di Ciolo, L.F. Tocchio and C. Gros, "Tunneling matrix elements with antiferromagnetic Gutzwiller wave functions", Phys. Rev. B 83, 165116 (2011).
- (4) L.F. Tocchio, F. Becca and C. Gros, "Interaction-induced Fermi-surface renormalization in the t_1 - t_2 Hubbard model close to the Mott-Hubbard transition", Phys. Rev. B 81, 205109 (2010).
- (3) L.F. Tocchio, A. Parola, C. Gros and F. Becca, "Spin-liquid and magnetic phases in the anisotropic triangular lattice: The case of $\kappa - (\text{ET})_2\text{X}$ ", Phys. Rev. B 80, 064419 (2009).
- (2) F. Becca, L.F. Tocchio and S. Sorella, "Metal-insulator transition and strong-coupling spin liquid in the t - t' Hubbard model", J. Phys.: Conf. Ser. 145, 012016 (2009).

(1) L.F. Tocchio, F. Becca, A. Parola and S. Sorella, "Role of backflow correlations for the nonmagnetic phase of the t - t' Hubbard model", Phys. Rev. B 78, 041101(R) (2008).

Bibliometric data

Total number of citations: 709, h-index: 14, Source: Web of Science

Total number of citations: 974, h-index: 16, Source: Google Scholar

ORGANIZZAZIONE, DIREZIONE E COORDINAMENTO DI CENTRI O GRUPPI DI RICERCA NAZIONALI E INTERNAZIONALI O PARTECIPAZIONE AGLI STESSI

(per ciascuna voce inserire anno, ruolo, gruppo di ricerca, ecc.)

Participation into research projects:

- Nov 2013 - Jan 2016; Italian research project: "PRIN 2010-2011: Fenomeni quantistici collettivi: dai sistemi fortemente correlati ai simulatori quantistici"
- Dec 2008 - Oct 2013: German research project: "SFB/TR 49: Condensed Matter Systems with Variable Many-Body Interactions"
- 2008: Italian research project: "PRIN 2007: Ruolo della forte correlazione elettronica nei superconduttori non convenzionali, in sistemi bidimensionali di elettroni in dispositivi e in sistemi a molti corpi di recente interesse fisico e chimico".

ATTIVITÀ QUALI LA DIREZIONE O LA PARTECIPAZIONE A COMITATI EDITORIALI DI RIVISTE SCIENTIFICHE

(per ciascuna voce inserire anno, ruolo, rivista scientifica, ecc.)

TITOLARITÀ DI BREVETTI

(per ciascun brevetto, inserire autori, titolo, tipologia, numero brevetto, ecc.)

PREMI E RICONOSCIMENTI NAZIONALI E INTERNAZIONALI PER ATTIVITÀ DI RICERCA

(inserire premio, data, ente organizzatore, ecc.)

Europhysics Letters (EPL) Award for the best contributed talk at the conference: "Correlations, integrability, and criticality in quantum systems", 24-28 October, 2016 - Évora (Portugal). Talk title: "Hidden Mott transition and large- U superconductivity in the two-dimensional Hubbard model". The prize is assigned to the best presentations by young researchers attending selected conferences, workshops, and summer schools.

PARTECIPAZIONE IN QUALITÀ DI RELATORE A CONGRESSI E CONVEGNI DI INTERESSE INTERNAZIONALE

(inserire titolo congresso/convegno, data, ecc.)

ParisEdge 2019, 25-28 September, 2019 - Paris (France), oral contribution.

APS March Meeting, 4-8 March, 2019 - Boston (United States), oral contribution and session chair.

FisMat 2017, 1-6 October 2017 - Trieste (Italy), oral contribution.

9th World Congress on Materials Science and Engineering, 12-14 June 2017 - Rome (Italy), **invited speaker**.

APS March Meeting, 13-17 March, 2017 - New Orleans (United States), oral contribution.

Correlations, integrability, and criticality in quantum systems, 24-28 October, 2016 - Evora (Portugal), oral contribution.

Theoretical and Experimental Magnetism Meeting 2016, 16-17 June, 2016 - Rutherford Appleton Lab (UK), poster contribution.

FisMat 2015, 28 September - 2 October, 2015 - Palermo (Italy), oral contribution.

11th International Symposium on Crystalline Organic Metals, Superconductors and Magnets, 6-11 September, 2015 - Bad Gönning (Germany), **invited speaker**.

Workshop on Interacting Fermions: Precision Theory and Experiment, 6-10 July, 2015 - Trieste (Italy), poster contribution.

Workshop on Gutzwiller Wave Functions and Related Methods, 16-19 June, 2014 - Valence (France), oral contribution.

Condensed Matter Physics in the City: Intertwined electronic and atomic order, 9-13 June, 2014 - London (UK), **invited speaker**.

Novel states in correlated condensed matter - from model systems to real materials, 8-10 April, 2014 - Königstein (Germany), poster contribution.

Spring Meeting of the German Physical Society
30 March- 4 April, 2014 - Dresden (Germany), oral contribution.

Quantum spin liquids: from theory to numerical simulations, 9-20 September, 2013 - Trieste (Italy), poster contribution.

The New Generation in Strongly Correlated Electron Systems 2013, 1-5 July, 2013 - Sestri Levante, Genova (Italy), poster contribution.

Spring Meeting of the German Physical Society
11-15 March, 2013 - Regensburg (Germany), oral and poster contribution.

Correlations and coherence in quantum systems, 8-12 October, 2012 - Evora (Portugal), poster contribution.

Annual Retreat of the SFB/TR 49, 20-21 September, 2012 - Wiesbaden (Germany), oral contribution.

Summer School on Low-Dimensional Quantum Many-Body Systems, 16-21 August, 2012 - Trier (Germany), poster contribution.

Quantum Magnetism in Low Spatial Dimensions, 16-18 April, 2012 - Bad Honnef (Germany), poster contribution.

Spring Meeting of the German Physical Society, 26-30 March, 2012 - Berlin (Germany), oral contribution.

APS March Meeting, 27 February-2 March, 2012 - Boston (United States), oral contribution.

Annual Retreat of the SFB/TR 49, 15-16 September, 2011 - Alzey (Germany), oral contribution.

Spring Meeting of the German Physical Society, 13-18 March, 2011 - Dresden (Germany), oral contribution.

Korrelationstage 2011, 28 February-4 March, 2011 - Dresden (Germany), poster contribution.

Annual Retreat of the SFB/TR 49, 7-8 October, 2010 - Kaiserslautern (Germany), oral contribution.

Workshop on Emergence of New States of Matter in Magnetic Systems and Beyond, 5-9 July, 2010 - ICTP Trieste (Italy), poster contribution.

Spring Meeting of the German Physical Society, 21-26 March 2010 - Regensburg (Germany), oral and poster contribution.

Novel states in correlated condensed matter - from model systems to real materials, 2-4 March 2010 - Berlin (Germany), poster contribution.

XIV Training Course in the Physics of Strongly Correlated Systems, 5-16 October, 2009 - Vietri sul Mare, Salerno (Italy), oral contribution.

Annual Retreat of the SFB/TR 49, 24-25 September, 2009 - Oberursel (Germany), oral contribution.

Joint European Japanese Conference: Frustration in Condensed Matter, 12-15 May, 2009 - Lyon (France), poster contribution.

International Conference on Strongly Correlated Electron Systems 2008, 17-22 August, 2008 - Buzios, Rio de Janeiro (Brazil), poster contribution.

Advanced School on Quantum Monte Carlo Methods in Physics and Chemistry, 21 January-2 February, 2008 - ICTP, Trieste (Italy), poster contribution.

XII Training course in the Physics of Strongly Correlated Systems, 1-12 October, 2007 - Vietri sul Mare, Salerno (Italy), oral contribution.

ATTIVITÀ GESTIONALI, ORGANIZZATIVE E DI SERVIZIO

INCARICHI DI GESTIONE E AD IMPEGNI ASSUNTI IN ORGANI COLLEGIALI E COMMISSIONI, PRESSO RILEVANTI ENTI PUBBLICI E PRIVATI E ORGANIZZAZIONI SCIENTIFICHE E CULTURALI, OVVERO PRESSO L'ATENEO O ALTRI ATENEI

(inserire incarico/impegno, ente, data, ecc.)

External member of the entrance examination committee for the Ph.D. in Theoretical Condensed Matter Physics at the International School for Advanced Studies (SISSA), Trieste (Italy), 25-27 March 2020;

Scientific Evaluator for the Italian SuperComputing Resource Allocation (ISCRA) of CINECA.

ATTIVITÀ CLINICO ASSISTENZIALI

(indicare, data, durata, ruolo, ente presso il quale si è prestata attività assistenziale, ecc.)

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Data

03/06/2021

Luogo

Torino