

Curriculum vitæ

Name: **Federico Becca**
Nationality: Italian
Place of Birth: Roma (Italy)
Date of Birth: 14 January 1972
Marital Status: Married
Languages: Italian (mother tongue), English, French
Present Position: Research Assistant at
CNR-IOM DEMOCRITOS National Simulation Center
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Research Interests

I am a condensed matter theorist and my main research interests lie in the study of strongly correlated electronic systems. These are materials where the interactions between electrons play a crucial role and lead to novel phenomena not explainable by single electron band structure effects. Examples include the Mott insulators, spin liquids, and topological phases. By using numerical methods, like classical and quantum Monte Carlo, exact diagonalization, density-matrix renormalization group, and analytic approaches (slave particles, Gutzwiller approximation, and spin waves), I focused my attention on Hubbard-like models and their generalizations. In particular, I worked on:

- Charge and spin instabilities in strongly correlated systems.
- Frustrated magnetic systems.
- Metal-insulator and superfluid-insulator transitions.
- Correlated systems in presence of disorder.
- Thermalization and real-time dynamics for quantum systems
- Classical and quantum Monte Carlo methods.
- Lanczos and exact diagonalizations.

Education and Degrees

- October 1990 - December 1995: Undergraduate studies in Physics at the University “La Sapienza”, Roma (Italy).
- January 1996: Degree in Physics 110/110 *cum laude*, University “La Sapienza”, Roma (Italy). Title of the thesis: *Charge instabilities in strongly correlated electron systems*, Supervisor: Prof. C. di Castro.
- October 1996: Admitted to a Ph.D. position at Scuola Internazionale Superiore di Studi Avanzati, Trieste (Italy).

- October 1997: “Magister Philosophiæ”, Scuola Internazionale Superiore di Studi Avanzati, Trieste (Italy). Title of the thesis: *Charge-density waves in semiconductor surfaces*, Supervisor: Dr G. Santoro.
- November 1998 - September 1999: Military service.
- October 2000: “Doctor Philosophiæ” *cum laude*, Scuola Internazionale Superiore di Studi Avanzati, Trieste (Italy). Title of the thesis: *Electronic properties from strong correlation*, Supervisor: Prof. S. Sorella.

Employments

- From November 2000 to August 2002: Post-doctoral research assistant at Institut de Physique Théorique, University of Lausanne (Switzerland), in the group of Prof. F. Mila.
- From September 2002 to October 2004: Research associate position at Istituto Nazionale per la Fisica per la Materia (INFM), Trieste (Italy).
- From November 2004 to March 2008: Tenure Track position at the INFM DEMOCRITOS National Simulation Center, Trieste (Italy).
- Since April 2008: Researcher for Consiglio Nazionale delle Ricerche (CNR) at the DEMOCRITOS National Simulation Center, Trieste (Italy).

Academic Appointments

- November 2010: Habilitation for associate professor (FIS03) at the Italian national level.
- October 2014: Habilitation for associate professor in theoretical condensed matter (02/B2) at the Italian national level.
- October 2014: Habilitation for full professor in theoretical condensed matter (02/B2) at the Italian national level.

Research Appointments

- May 2004: Invited scientist at Ecole Polytechnique Fédérale de Lausanne (Switzerland), in the group of Prof. F. Mila.
- May 2005 (two weeks): Invited scientist at the University “Pierre et Marie Curie” Paris VI (France), in the group of Prof. C. Lhuillier.
- From September to November 2005: Invited scientist of the Centre National de la Recherche Scientifique (CNRS) at the University of Toulouse “Paul Sabatier” (France), in the group of Prof. D. Poilblanc.
- June 2006: Invited scientist at Ecole Polytechnique Fédérale de Lausanne (Switzerland), in the group of Prof. F. Mila.
- October 2007 (five weeks): Invited scientist at Kavli Institute for Theoretical Physics (KITP), Santa Barbara (California) for the program *Moments and Multiplets in Mott Materials*.

- May and November 2008: Invited scientist at Ecole Polytechnique Fédérale de Lausanne (Switzerland), in the group of Prof. F. Mila.
- November 2009: Invited professor at University of Toulouse “Paul Sabatier” (France), in the group of Prof. D. Poilblanc.
- November 2010 (five weeks): Invited scientist at Kavli Institute for Theoretical Physics (KITP), Santa Barbara (California) for the program *Disentangling Quantum Many-body Systems: Computational and Conceptual Approaches* (also in the Advisory Board).
- May 2012: Invited professor at University of Toulouse “Paul Sabatier” (France), in the group of Prof. D. Poilblanc.
- September-October 2012 (seven weeks): Invited scientist at Kavli Institute for Theoretical Physics (KITP), Santa Barbara (California) for the program *Frustrated Magnetism and Quantum Spin Liquids: From Theory and Models to Experiments*, also local participant for the program *Quantum Dynamics in Far from Equilibrium Thermally Isolated Systems*.
- May 2014 (two weeks): Invited scientist at the Perimeter Institute for Theoretical Physics, Waterloo (Ontario).

Other Professional Services

- Since September 2002: Associated member of the Condensed Matter group of Scuola Internazionale Superiore di Studi Avanzati, Trieste (Italy).
- Since April 2010: Member of the Council of the Istituto Officina dei Materiali (IOM), Consiglio Nazionale delle Ricerche (CNR).
- Since February 2011: Teaching appointment for “Numerical methods for lattice models of strongly-correlated quantum systems” at Scuola Internazionale Superiore di Studi Avanzati, Trieste (Italy).
- Since January 2013: Member of the Board of Directors for the Centre Europeen de Calcul Atomique et Moleculaire (CECAM).

Teaching Experience

- November 2000 - June 2002: Assistant for “Mecanique Quantique Avancée” and “Physique du Solide Avancée”, in French (Advanced Quantum Mechanics and Advanced Solid State Physics), Ecole Polytechnique Fédérale de Lausanne (Switzerland).
- Since November 2002: Lecturer for the course on “Numerical methods for strongly correlated systems”, Scuola Internazionale Superiore di Studi Avanzati, Trieste (Italy).

Referee Activity and Advisory Boards

- Referee for Physical Review Letters, Physical Review A, B, E, and X European Journal of Physics B, Europhysics Letters, Journal of the Physical Society of Japan, New Journal of Physics, Scientific Reports, Physica A, and Journal of Low Temperature Physics.
- Referee for the American National Science Foundation (NSF), for grant proposals.
- Referee for the European Research Council (ERC), for “Starting Grants” proposals.

- Member of the Scientific Advisory Board for the International Conference on Highly Frustrated Magnetism (HFM) 2008, 2012, and 2014.

Supervised Diploma and Master Students

- March 2002: “Diploma” (Ecole Polytechnique Fédérale de Lausanne) *Dynamical properties of the Heisenberg antiferromagnet on a trimerized Kagomé lattice: a classical Monte Carlo study* by M. Ferrero (together with F. Mila).
- March 2003: “Diploma” (Ecole Polytechnique Fédérale de Lausanne) *Study of the classical Heisenberg antiferromagnet model on the square lattice with nearest and next-nearest neighbor couplings* by C. Weber (together with F. Mila).
- October 2003: “Magister Philosophiæ” (Scuola Internazionale Superiore di Studi Avanzati) *The quantum dimer model on the square lattice* by M. Ferrero.
- October 2003: “Magister Philosophiæ” (Scuola Internazionale Superiore di Studi Avanzati) *Variational approach of the Mott transition in the one-dimensional Hubbard model* by M. Capello (together with S. Sorella and M. Fabrizio).
- October 2005: “Magister Philosophiæ” (Scuola Internazionale Superiore di Studi Avanzati) *A new variational wave function for the $t-J$ model in the low-doping region* by M. Lugas (together with S. Sorella).
- October 2007: “Magister Philosophiæ” (Scuola Internazionale Superiore di Studi Avanzati) *Spin susceptibility in frustrated antiferromagnets* by J. Carrasquilla (together with S. Sorella).
- December 2010: “Magister Philosophiæ” (Scuola Internazionale Superiore di Studi Avanzati) *Phase diagram of the two-dimensional Kondo lattice model* by M.Z. Asadzadeh (together with M. Fabrizio).
- December 2010: Co-supervisor of the “Master Thesis” (Universiteit Utrecht) *Numerical study of the trapped and extended Bose-Hubbard models* by T. Comparin (supervisor C. de Morais Smith).

Supervised Ph.D. Students

- October 2006: “Doctor Philosophiæ” (Scuola Internazionale Superiore di Studi Avanzati) *Variational study of the Mott insulators* by M. Capello (together with S. Sorella and M. Fabrizio).
- October 2006: “Doctor Philosophiæ” (Scuola Internazionale Superiore di Studi Avanzati) *Competing mechanisms in strongly correlated systems close to a Mott transition* by M. Ferrero (together with M. Fabrizio).
- October 2007: “Doctor Philosophiæ” (Scuola Internazionale Superiore di Studi Avanzati) *d -wave Superconductivity and antiferromagnetism in strongly correlated systems by a new variational approach* by M. Lugas (together with S. Sorella).
- October 2008: “Doctor Philosophiæ” (Scuola Internazionale Superiore di Studi Avanzati) *A new variational wave function with backflow correlations for frustrated Hubbard models* by L.F. Tocchio (together with S. Sorella).
- October 2008: “Doctor Philosophiæ” (Scuola Internazionale Superiore di Studi Avanzati) *Disorder and interaction: ground-state properties of the disordered Hubbard model* by M.E. Pezzoli (together with M. Fabrizio).

- October 2010: “Doctor Philosophiæ” (Scuola Internazionale Superiore di Studi Avanzati) *The Bose-Hubbard model with disorder in low-dimensional lattices* by J. Carrasquilla (together with M. Fabrizio).
- October 2011: “Doctor Philosophiæ” (Scuola Internazionale Superiore di Studi Avanzati) *Spectral and dynamical properties of strongly-correlated systems: methods and applications* by G. Carleo (together with S. Baroni and S. Moroni).
- September 2012: Co-supervisor of the “Doctor Philosophiæ” (Université de Toulouse III, Paul Sabatier) *Spin liquids in quantum antiferromagnetic models on two dimensional frustrated lattices* by Y. Iqbal (supervisor: D. Poilblanc).
- September 2013: “Doctor Philosophiæ” (Scuola Internazionale Superiore di Studi Avanzati) *Unconventional phases in doped or frustrated quantum antiferromagnets: a systematic quantum Monte Carlo study* by W.-J. Hu (together with S. Sorella).
- November 2013: “Doctor Philosophiæ” (Scuola Internazionale Superiore di Studi Avanzati) *Interplay of superconductivity and magnetism in the two-dimensional Kondo lattice model* by M.Z. Asadzadeh (together with M. Fabrizio).

Organization of Workshops and Schools

- Director of the “School and Workshop on Highly Frustrated Magnets and Strongly Correlated Systems: From Non-Perturbative Approaches to Experiments” (30 July – 17 August 2007) with F. Essler, F. Mila, S. Shastry, and A. Tsvelik. Held at the International Center of Theoretical Physics (ICTP) in Trieste.
- Director of the workshop “Emergence of New States of Matter in Magnetic Systems and Beyond” (5 – 9 July 2010) with M. Kiselev, B. Kumar, and F. Mila. Held at the International Center of Theoretical Physics (ICTP) in Trieste.
- Scientific Advisor for the “First Conference of Condensed Matter and Computational Materials” at the Dipartimento dei Materiali e Dispositivi del CNR (21 – 22 February 2011). Held at the CNR in Roma.
- Director of the 2nd CECAM Summer School on “Atomistic Simulation Techniques for Material Science, Nanotechnology, and Biophysics” (4 – 29 July 2011) with S. de Gironcoli, A. Laio, and C. Micheletti. Held at Scuola Internazionale Superiore di Studi Avanzati, Trieste (Italy).
- Director of the CECAM/ICTP Winter School on “Quantum Monte Carlo Methods at Work for Novel Phases of Matter” (23 January – 3 February 2012) with S. Moroni, M. Mueller, and S. Sorella. Held at the International Center of Theoretical Physics (ICTP) in Trieste.
- Director of the 3rd CECAM Summer School on “Atomistic Simulation Techniques for Material Science, Nanotechnology, and Biophysics” (9 – 27 July 2012) with S. de Gironcoli, A. Laio, and S. Piccinin. Held at Scuola Internazionale Superiore di Studi Avanzati, Trieste (Italy).
- Director of the 4th CECAM Summer School on “Atomistic Simulation Techniques for Material Science, Nanotechnology, and Biophysics” (4 – 26 July 2013) with G. Bussi, S. Piccinin, and A. Rosa. Held at Scuola Internazionale Superiore di Studi Avanzati, Trieste (Italy).
- Director of the CECAM Summer School on “Quantum Spin Liquids: from Theory to Numerical Simulations” (9 – 20 September 2013) with G. Misguich and D. Poilblanc. Held at Scuola Internazionale Superiore di Studi Avanzati, Trieste (Italy).

- Director of the 5th CECAM Summer School on “Atomistic Simulation Techniques for Material Science, Nanotechnology, and Biophysics” (30 June – 18 July 2014) with G. Bussi, S. Piccinin, and A. Rosa. Held at Scuola Internazionale Superiore di Studi Avanzati, Trieste (Italy).

Lectures for Schools

- July 2011: Lecturer for the 2nd Summer School on “Atomistic Simulation Techniques for Material Science, Nanotechnology, and Biophysics”, Scuola Internazionale Superiore di Studi Avanzati, Trieste (Italy). *Introduction of Monte Carlo Methods*, 10 hours plus 15 of tutorial.
- June 2012: Lecturer for the LOTHERM Summer School, University of Ljubljana (Slovenia). *Introduction to Quantum Spin Liquids*, 1 hour and a half.
- July 2012: Lecturer for the 3rd Summer School on “Atomistic Simulation Techniques for Material Science, Nanotechnology, and Biophysics”, Scuola Internazionale Superiore di Studi Avanzati, Trieste (Italy). *Introduction of Monte Carlo Methods*, 9 hours plus 15 of tutorial.
- July 2013: Lecturer for the 4th Summer School on “Atomistic Simulation Techniques for Material Science, Nanotechnology, and Biophysics”, Scuola Internazionale Superiore di Studi Avanzati, Trieste (Italy). *Introduction to Numerical Methods (Integration, Derivation, and Differential Equations)* and *Introduction of Monte Carlo Methods*, 13 hours plus 21 of tutorial.
- April 2014: Lecturer for the International School on “Probing Macroscopic Quantum Phenomena”, Königstein (Germany). *Quantum Spin Liquids: Basic Definitions and General Properties*, 3 hours.
- July 2014: Lecturer for the 5th Summer School on “Atomistic Simulation Techniques for Material Science, Nanotechnology, and Biophysics”, Scuola Internazionale Superiore di Studi Avanzati, Trieste (Italy). *Introduction of Monte Carlo Methods*, 9 hours plus 15 of tutorial.

Invited Talks

- March 2000: Invited talk at the “XIX Convegno di Fisica Teorica e Struttura della Materia”, Fai della Paganella (Italy). *Ferromagnetism and superconductivity in the strong coupling Hubbard model*.
- October 2001: Invited talk at the “2001 Swiss Workshop on Materials with Novel Electronic Properties”, Les Diablerets (Switzerland). *Heisenberg systems coupled to phonons*.
- March 2003: Invited talk at the “XXII Convegno di Fisica Teorica e Struttura della Materia”, Fai della Paganella (Italy). *SrCu₂(BO₃)₂: A remarkable spin-gapped spin system*.
- August 2003: Invited talk at the second conference on “Highly Frustrated Magnetism”, Grenoble (France). *The chiral spin-liquid and the Lieb-Schultz-Mattis theorem*.
- September 2003: Invited talk at the “LXXXIX Convegno Nazionale della Società Italiana di Fisica”, Parma (Italy). *Spin-phonon coupling in highly frustrated magnetic systems*.
- June 2004: Invited talk at the “IX Convegno Nazionale di Fisica Statistica”, Parma (Italy). *Ising transition driven by frustration in a 2D classical model with continuous symmetry*.
- November 2005: Invited talk at the conference “Highly Frustrated Magnetism”, La Londe Les Maures (France). *An improved variational phase diagram for the J₁–J₂ model on the square lattice*.
- October 2005: Invited talk at “Conference on Concepts in Electron Correlation”, Hvar (Croatia). *Improved variational approach to strongly correlated systems: the RVB paradigm at work*.

- October 2005: Invited talk at the conference on “Gutzwiller Wave Functions and Related Slave-Boson Mean-Field Theories”, Marburg (Germany). *Is it possible to understand the metal-insulator transition from a variational approach?*
- March 2006: Invited talk at the CECAM conference on “Novel Theoretical Aspects of Frustrated Spin Systems”, Lyon (France). *Variational approach to magnetic systems: the J_1 – J_2 model on the square lattice.*
- September 2006: Invited talk at the “XCII Convegno Nazionale della Società Italiana di Fisica”, Torino, Italy. *An improved variational approach for strongly correlated models: Metal-insulator transition and frustrated spin systems.*
- January 2007: Invited talk at the International Focus Workshop on “Mobile Fermions and Bosons on Frustrated Lattices”, Dresden (Germany). *Dynamics of a dimer liquid.*
- August 2007: Invited talk at the workshop on “Highly Frustrated Magnets and Strongly Correlated Systems: From Non-Perturbative Approaches to Experiments” Trieste (Italy). *Variational description of Mott insulators with charge fluctuations.*
- October 2007: Open discussion at the KITP Program on “Moments and Multiplets in Mott Materials” Santa Barbara (California) *Variational description of spin liquids in frustrated magnets.*
- June 2008: Invited talk at the conference on “Entanglement in Spin and Orbital Systems”, Cracow (Poland). *Magnetism and superconductivity in the t – t' – J model.*
- September 2008: Invited talk at the fourth conference on “Highly Frustrated Magnetism”, Braunschweig (Germany). *Metal-insulator transition and spin-liquid phases in the triangular lattice.*
- November 2008: Invited talk at the conference on “Monte Carlo Methods”, Sardinia (Italy). *Variational description of correlated systems: Mott insulators and spin liquids.*
- May 2009: Invited talk at the “Joint European-Japanese Conference: Frustration in condensed matter”, Lyon, France. *Spin-1/2 Heisenberg model on the anisotropic triangular lattice: from magnetism to 1D spin liquid.*
- October 2009: Invited talk at the conference “Magnet 09”, Roma (Italy). *Spin-liquid and magnetic phases in the anisotropic triangular lattice: the case of k – $(ET)_2X$.*
- June 2010: Invited talk at the conference “New Trends in Quantum Magnetism”, Orsay (France). *Metal-insulator transition and spin-liquid phases in the anisotropic triangular lattice.*
- July 2010: Invited talk at the CECAM school on “Atomistic Simulation Techniques for Material Science, Nanotechnology, and Biophysics”, Trieste (Italy). *Variational wave functions for lattice models.*
- August 2010: Invited talk at the fifth conference on “Highly Frustrated Magnetism”, Baltimore (Maryland). *Metal-insulator transition and Fermi surface evolution in frustrated triangular-based lattice.*
- October 2010: Invited talk at conference on “Emerging Trends in Advanced Correlated Materials”, Anacapri (Italy). *Metal-insulator transition and Fermi surface evolution in frustrated triangular-based lattice.*
- November 2010: Invited talk at KITP program “Disentangling Quantum Many-body Systems: Computational and Conceptual Approaches”, Santa Barbara (California). *Metal-insulator transition and Fermi surface evolution in frustrated triangular-based lattice.*

- August 2012: Invited talk at the “Innovations in Strongly Correlated Electron Systems: School and Workshop”, Trieste (Italy). *Talk not given because of personal problems.*
- August 2012: Invited talk at the “Workshop on Complex Quantum Systems: Non-Ergodicity, Glassiness and Localization”, Trieste (Italy). *Localization and glassy dynamics of many-body quantum systems.*
- September 2012: Invited talk at the KITP Program on “Frustrated Magnetism and Quantum Spin Liquids: From Theory and Models to Experiments” Santa Barbara (California) *Projected wave functions for frustrated spin models.*
- September 2012: Open discussion at the KITP Program on “Frustrated Magnetism and Quantum Spin Liquids: From Theory and Models to Experiments” Santa Barbara (California) *Can a Jastrow wave function describe Mott insulators?*
- October 2012: Invited talk at the Conference on “Exotic Phases of Frustrated Magnets” Santa Barbara (California) *Improved variational wave functions for the Heisenberg model on the Kagome lattice.*
- September 2013: Invited talk at the “XCIX Convegno Nazionale della Società Italiana di Fisica”, Trieste (Italy). *Light-cone effects and Lieb-Robinson bounds in one and two dimensions.*
- October 2013: Invited talk at the workshop on “Mott Physics Beyond the Heisenberg Model”, Ascona (Switzerland). *Gapless spin liquids in frustrated antiferromagnets.*
- April 2014: Invited talk at the 2nd International Symposium on “Novel States in Correlated Condensed Matter: from Model Systems to Real Materials”, Königstein (Germany). *Gapless spin liquids in the Kagome antiferromagnet.*
- June 2014: Invited talk at the CECAM workshop “What about U? Strong Correlations from First Principles”, Lausanne (Switzerland). *Jastrow and backflow terms for correlated electrons on the lattice.*
- June 2014: Invited talk at the Symposium on “New Horizon of Strongly Correlated Physics”, Kashiwa (Japan). *Gapless spin liquids in frustrated Heisenberg models.*
- August 2014: Invited talk at the “XXVI IUPAP Conference on Computational Physics”, Boston (Massachusetts). *Variational wave functions for strongly-correlated models.*
- September 2014: Invited colloquium at the “International Workshop and Seminar on Quantum Spin Dynamics: From Exotic Excitations to Novel Transport and Non-Equilibrium Phenomena”, Dresden (Germany). *What can we describe (and even understand?) by using resonating-valence bond states for frustrated spin systems? Gapped and gapless quantum spin liquids.*

Seminars

- November 2000: Seminar at the University of Lausanne (Switzerland). *Stability of d-wave superconductivity in the t - J model.*
- February 2001: Seminar at the meeting “Fermions Fortement Correlés”, Lausanne (Switzerland). *Superconductivity and stripes in the t - J model.*
- October 2001: Seminar at the meeting “Fermions Fortement Correlés”, Fribourg (Switzerland). *Ground-state properties of the 2D t - J model: superconductivity vs stripes.*

- December 2001: Seminar at the University of Toulouse (France). *Ground-state properties of the 2D t - J model: a quantum Monte Carlo study.*
- May 2002: Seminar at the University of Pavia (Italy). *Lattice effects in the 1/8 magnetization plateau of $\text{SrCu}_2(\text{BO}_3)_2$.*
- February 2003: Seminar at the University of Como (Italy). *Peierls-like transition induced by frustration in a two-dimensional antiferromagnet.*
- May 2004: Seminar at the Eidgenössische Technische Hochschule Zurich (Switzerland). *A first step toward the variational description of Mott insulators.*
- May 2004: Seminar at the University of Fribourg (Switzerland). *A first step toward the variational description of Mott insulators.*
- May 2004: Seminar at the Ecole Polytechnique Fédérale de Lausanne (Switzerland). *A first step toward the variational description of Mott insulators.*
- March 2005: Seminar at the Oak Ridge National Laboratories (Tennessee). *Zero-temperature properties of the quantum dimer model on the triangular lattice.*
- May 2005: Seminar at the University “Pierre et Marie Curie” Paris VI, (France). *The resonating valence bond wave function in quantum antiferromagnets.*
- July 2005: Seminar at Massachusetts Institute of Technology (Massachusetts). *Critical behavior of the two-dimensional metal-insulator transition.*
- September 2005: Seminar at University of Toulouse (France). *Unconventional metal-insulator transition in the two-dimensional.*
- November 2005: Seminar at the University of Toulouse (France). *An improved variational phase diagram for the J_1 - J_2 model on the square lattice.*
- March 2007: Seminar at the Istituto dei Sistemi Complessi (CNR), Roma (Italy). *Variational description of the Mott transition.*
- November 2008: Seminar at the Ecole Polytechnique Fédérale de Lausanne (Switzerland). *Metal-insulator transition and spin-liquid phases in the triangular lattice.*
- November 2008: Seminar at the University of Fribourg (Switzerland). *Metal-insulator transition and spin-liquid phases in the triangular lattice.*
- December 2008: Seminar at the University of Trento (Italy). *Variational description of bosonic Mott insulators.*
- June 2009: Seminar at the University of Frankfurt (Germany). *Variational wave functions for Mott insulators.*
- October 2009: Seminar at the European Laboratory for Non-linear Spectroscopy (LENS), Firenze (Italy). *Strongly-correlated bosons: from superfluidity to Mott insulators.*
- November 2009: Seminar at the University of Paris Sud, Orsay (France). *Metal-insulator transition and spin-liquid phases in the anisotropic triangular lattice.*
- November 2009: Seminar at the University of Toulouse (France). *Interplay between disorder and interaction in the Bose-Hubbard model.*

- March 2010: Seminar at the University of Rutgers (New Jersey). *A review on the variational wave functions for correlated systems.*
- June 2010: Seminar at the University of Frankfurt (Germany). *The Bose-glass phase in disordered systems.*
- September 2010: Seminar at the University of Toulouse (France). *The Bose-glass phase in disordered systems.*
- April 2011: Blackboard discussion at the University of Frankfurt (Germany). *Quantum quenches and the approach to equilibrium: the variational perspectives.*
- November 2011: Seminar at the University of Frankfurt (Germany). *Localization and glassy dynamics of many-body quantum systems.*
- March 2012: Seminar at the Georgetown University (Washington DC). *Localization and glassy dynamics of many-body quantum systems.*
- April 2012: Seminar at University of Toulouse (France). *Variational description of real-time dynamics.*
- May 2012: Seminar at the University of Trento (Italy). *Localization and glassy dynamics of many-body quantum systems.*
- November 2012: Seminar at the University of Padova (Italy). *Possible many-body localization in the dynamics of correlated quantum systems.*
- February 2013: Seminar at the University of Lausanne (Switzerland). *Possible many-body localization in the dynamics of correlated quantum systems.*
- April 2013: Seminar at the University of Frankfurt (Germany). *Gapless spin liquids in frustrated antiferromagnets.*
- May 2013: Blackboard discussion at Scuola Internazionale Superiore di Studi Avanzati (Italy). *Quantum quenches in one-dimensional gapless systems.*
- May 2014: Seminar at the Perimeter Institute for Theoretical Physics (Ontario). *Gapless spin liquids in frustrated Heisenberg models.*

Dissemination seminars

- April 2012: Seminar at “Master in Comunicazione della Scienza”, Scuola Internazionale Superiore di Studi Avanzati, Trieste (Italy). *La Superconduttività.*
- February 2013: Seminar at “Master in Comunicazione della Scienza”, Scuola Internazionale Superiore di Studi Avanzati, Trieste (Italy). *La Superconduttività.*

Publications

Since 1996, I have published about 90 papers in international referred journals (including conference proceedings), among which 1 Science, 1 Scientific Report (Nature Publishing), 15 Physical Review Letters, and 58 Physical Review A, B, and E (among which 13 Rapid Communications).

Citations indexed on ISI web of Science: more than 1800.

H-factor: 23.

Source: <http://www.researcherid.com/rid/K-3915-2013>

1. F. Becca, M. Tarquini, M. Grilli, and C. di Castro, *Charge-density-waves and superconductivity as an alternative to phase separation in the infinite- U Hubbard-Holstein model*, Physical Review B **54**, 12443 (1996).
2. F. Becca, F. Bucci, and M. Grilli, *The incommensurate charge-density-wave instability in the extended three-band Hubbard model*, Physical Review B **57**, 4382 (1998).
3. M. Calandra, F. Becca, and S. Sorella, *Charge fluctuations close to phase separation in the two dimensional t - J model*, Physical Review Letters **81**, 5185 (1998).
4. G. Seibold, F. Becca, F. Bucci, C. Castellani, C. di Castro, and M. Grilli, *Spectral properties of incommensurate charge-density wave systems*, European Physical Journal B **13**, 87 (2000).
5. F. Becca, A. Parola, and S. Sorella, *Ground-state properties of the Hubbard model by Lanczos diagonalizations*, Physical Review B **61**, 16287 (2000). Rapid Communication.
6. F. Becca, M. Capone, and S. Sorella, *Spatially homogeneous ground-state of the two-dimensional Hubbard model*, Physical Review B **62**, 12700 (2000).
7. F. Becca, L. Capriotti, S. Sorella, and A. Parola, *Exact bounds on the ground-state energy of the infinite- U Hubbard model*, Physical Review B **62**, 15277 (2000).
8. M. Capone, L. Capriotti, F. Becca, and S. Caprara, *The Mott metal-insulator transition in the half-filled Hubbard model on the triangular lattice*, Physical Review B **63**, 085104 (2001).
9. F. Becca and S. Sorella, *Nagaoka ferromagnetism in the two-dimensional infinite- U Hubbard model*, Physical Review Letters **86**, 3396 (2001).
10. L. Capriotti, F. Becca, A. Parola, and S. Sorella, *Resonating valence bond wave functions for strongly frustrated spin systems*, Physical Review Letters **87**, 097201 (2001).
11. F. Becca, L. Capriotti, and S. Sorella, *Stripes and spin incommensurabilities are favored by lattice anisotropies*, Physical Review Letters **87**, 167005 (2001).
12. L. Capriotti and F. Becca, *Quantum phase transition in coupled spin ladders*, Physical Review B **65**, 092406 (2002).
13. S. Sorella, G.B. Martins, F. Becca, C. Gazza, L. Capriotti, A. Parola, and E. Dagotto, *Superconductivity in the two-dimensional t - J model*, Physical Review Letters **88**, 117002 (2002).
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