

Curriculum vitæ

Name: Federico Becca
Nationality:
Place of Birth:
Date of Birth:
Marital Status:
Languages: Italian (mother tongue), English, French
Present Position: Research Assistant at
CNR-IOM DEMOCRITOS National Simulation Center
Address for correspondence: Scuola Internazionale Superiore di Studi Avanzati,
Via Bonomea 265, I-34136 Trieste, Italy.
tel. +39-040-3787405
fax +39-040-3787528
e-mail address: becca@sissa.it

Education

- 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 semiconductors 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. External examiner: Prof. T.M. Rice.

Employments

- From November 2000 to August 2002: Research Assistant position 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 for the Istituto Nazionale per la Fisica per la Materia (INFN), Trieste (Italy).
- From November 2004 to March 2008: Tenure Track research position for the INFN DEMOCRITOS National Simulation Center, Trieste (Italy).
- Since April 2008: Research Assistant for Consiglio Nazionale delle Ricerche (CNR) at the DEMOCRITOS National Simulation Center, Trieste (Italy).

Visiting Positions

- 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 at 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.

Other Professional Services

- Since September 2002: Associated member of the Condensed Matter group of the International School for Advanced Studies.
- Since April 2010: Member of the Council of the "Istituto Officina dei Materiali" (IOM), Consiglio Nazionale delle Ricerche (CNR).

Research Interests

My research is based on strongly correlated systems in low dimensions and it is related to low-temperature properties of itinerant electrons and frustrated magnetic systems. In particular, by using numerical methods, like classical and quantum Monte Carlo, exact diagonalization, dynamical mean-field theory, and semi-analytic approaches (slave bosons, Gutzwiller approximation, and spin waves), I focused my attention on Hubbard-like models and their generalizations.

- Charge and spin instabilities in strongly correlated systems.
- Microscopic models for high-temperature superconductors.
- Frustrated magnetic systems.
- Metal-insulator and superfluid-insulator transitions.
- Correlated systems in presence of disorder.
- Classical and quantum Monte Carlo methods.
- Lanczos and exact diagonalizations

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: Assistant for "Numerical methods for strongly correlated systems", Scuola Internazionale Superiore di Studi Avanzati, Trieste (Italy).

Supervised Diploma and Master Students

- March 2002: "Diploma" *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" *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" *The quantum dimer model on the square lattice* by M. Ferrero.
- October 2003: "Magister Philosophiæ" *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" *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" *Spin susceptibility in frustrated antiferromagnets* by J. Carrasquilla (together with S. Sorella)

Supervised Ph.D. Students

- October 2006: "Doctor Philosophiæ" *Variational study of the Mott insulators* by M. Capello (together with S. Sorella and M. Fabrizio).
- October 2006: "Doctor Philosophiæ" *Competing mechanisms in strongly correlated systems close to a Mott transition* by M. Ferrero (together with M. Fabrizio).
- October 2007: "Doctor Philosophiæ" *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" *A new variational wave function with backflow correlations for frustrated Hubbard models* by L.F. Tocchio (together with S. Sorella).
- October 2008: "Doctor Philosophiæ" *Disorder and interaction: ground-state properties of the disordered Hubbard model* by M.E. Pezzoli (together with M. Fabrizio).
- October 2010: "Doctor Philosophiæ" *The Bose-Hubbard model with disorder in low-dimensional lattices* by J. Carrasquilla (together with M. Fabrizio).

Organization of Workshops

- 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.

Referee Activity

- Referee for Physical Review Letters, Physical Review A and B, European Journal of Physics B, Europhysics Letters, and Journal of Low Temperature Physics.
- Referee for grant proposals from the American National Science Foundation (NSF).
- Referee for workshop proposals at the Centre Européen de Calcul Atomique et Moléculaire (CE-CAM).

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 J_1-J_2 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 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: Lecturer for the Summer School on "Atomistic Simulation Techniques for Material Science, Nanotechnology, and Biophysics", Scuola Internazionale Superiore di Studi Avanzati, Trieste (Italy).
- 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.*

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 Eidgenossische 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.*

Publications

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. G. Santoro, S. Sorella, F. Becca, S. Scandolo, and E. Tosatti, *Metallic charge density waves and insulating magnetic surface states for adlayer structures on semiconductors: extended Hubbard modeling*, Surface Science **402-404**, 802 (1998).
4. 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).
5. 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).
6. F. Becca, A. Parola, and S. Sorella, *Ground-state properties of the Hubbard model by Lanczos diagonalizations*, Physical Review B **61**, 16287(R) (2000).
7. F. Becca, M. Capone, and S. Sorella, *Spatially homogeneous ground-state of the two-dimensional Hubbard model*, Physical Review B **62**, 12700 (2000).
8. 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).
9. S. Caprara, M. Capone, L. Capriotti, and F. Becca, *Commensurate versus incommensurate spin-ordering in the triangular Hubbard model*, International Journal of Modern Physics B **14**, 3386 (2000).
10. 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).
11. F. Becca and S. Sorella, *Nagaoka ferromagnetism in the two-dimensional infinite- U Hubbard model*, Physical Review Letters **86**, 3396 (2001).
12. 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).
13. F. Becca, L. Capriotti, and S. Sorella, *Stripes and spin incommensurabilities are favored by lattice anisotropies*, Physical Review Letters **87**, 167005 (2001).
14. L. Capriotti and F. Becca, *Quantum phase transition in coupled spin ladders*, Physical Review B **65**, 092406 (2002).
15. 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).

16. F. Becca and F. Mila, *Peierls-like transition induced by frustration in a two dimensional antiferromagnet*, Physical Review Letters **89**, 037204 (2002).
17. L. Capriotti, F. Becca, S. Sorella, and A. Parola, *Comment on "Phase diagram of an asymmetric spin ladder"*, Physical Review Letters **89**, 149701 (2002).
18. K. Kodama, M. Takigawa, M. Horvatic, C. Berthier, H. Kageyama, Y. Ueda, S. Miyahara, F. Becca, and F. Mila, *Magnetic superstructure in the two-dimensional quantum antiferromagnet $\text{SrCu}_2(\text{BO}_3)_2$* , Science **298**, 395 (2002).
19. S. Sorella, A. Parola, F. Becca, L. Capriotti, C. Gazza, E. Dagotto, and G. Martins, *Reply to comment on "Superconductivity in the two dimensional t - J model"*, Physical Review Letters **89**, 279703 (2002).
20. G. Seibold, F. Becca, and J. Lorenzana, *Inhomogeneous Gutzwiller approximation with random phase fluctuations for the Hubbard model*, Physical Review B **67**, 085108 (2003).
21. L. Capriotti, F. Becca, S. Sorella, and A. Parola, *Ground state of a Heisenberg chain with next-nearest-neighbor bond alternation*, Physical Review B **67**, 172404 (2003).
22. L. Capriotti, F. Becca, A. Parola, and S. Sorella, *Suppression of dimer correlations in the two-dimensional J_1 - J_2 Heisenberg model: An exact diagonalization study*, Physical Review B **67**, 212402 (2003).
23. S. Miyahara, F. Becca, and F. Mila, *Theory of spin-density profile and lattice distortion in the magnetization plateaus of $\text{SrCu}_2(\text{BO}_3)_2$* , Physical Review B **68**, 024401 (2003).
24. F. Becca, F. Mila, and D. Poilblanc, *Tetramerization of a frustrated spin-1/2 chain*, Physical Review Letters **91**, 067202 (2003).
25. C. Weber, L. Capriotti, G. Misguich, F. Becca, M. Elhajal, and F. Mila, *Ising transition driven by frustration in a 2D classical model with continuous symmetry*, Physical Review Letters **91**, 177202 (2003).
26. S. Sorella, L. Capriotti, F. Becca, and A. Parola, *A chiral spin liquid wave function and the Lieb-Schultz-Mattis theorem*, Physical Review Letters **91**, 257005 (2003).
27. M. Ferrero, F. Becca, and F. Mila, *Freezing and large time scales induced by geometrical frustration*, Physical Review B **68**, 214431 (2003).
28. G. Seibold, F. Becca, P. Rubin, and J. Lorenzana, *Time-dependent Gutzwiller theory of magnetic excitations in the Hubbard model*, Physical Review B **69**, 155113 (2004).
29. M. Takigawa, K. Kodama, M. Horvatic, C. Berthier, H. Kageyama, Y. Ueda, S. Miyahara, F. Becca, and F. Mila, *The 1/8-magnetization plateau state in the 2D quantum antiferromagnet $\text{SrCu}_2(\text{BO}_3)_2$: spin superstructure, phase transition, and spin dynamics studied by high-field NMR*, Physica B **346-347**, 27 (2004).
30. K. Kodama, M. Takigawa, M. Horvatic, C. Berthier, H. Kageyama, Y. Ueda, S. Miyahara, F. Becca, and F. Mila, *Spin superstructure in the 1/8-magnetization plateau phase of the 2D orthogonal dimer system $\text{SrCu}_2(\text{BO}_3)_2$* , Journal of Magnetism and Magnetic Materials **272-276**, 25 (2004).
31. A. Parola, F. Becca, L. Capriotti, and S. Sorella, *Projected BCS wave functions for resonating valence bond spin liquids*, Journal of Magnetism and Magnetic Materials **272-276**, 138 (2004).

32. L. Capriotti and F. Becca, *Ground state of coupled spin-half ladders*, Journal of Magnetism and Magnetic Materials 272-276, 261 (2004).
33. M. Capello, F. Becca, M. Fabrizio, S. Sorella, and E. Tosatti, *Variational description of Mott insulators*, Physical Review Letters 94, 026406 (2005).
34. E. Plekhanov, F. Becca, and S. Sorella, *d-wave pairing in lightly doped Mott insulators*, Physical Review B 71, 064511 (2005).
35. A. Ralko, M. Ferrero, F. Becca, D. Ivanov, and F. Mila, *Zero-temperature properties of the quantum dimer model on the triangular lattice*, Physical Review B 71, 224109 (2005).
36. J. Dorier, F. Becca, and F. Mila, *Quantum compass model on the square lattice*, Physical Review B 72, 024448 (2005).
37. C. Weber, F. Becca, and F. Mila, *Finite-temperature properties of frustrated classical spins coupled to the lattice*, Physical Review B 72, 024449 (2005).
38. M. Capello, F. Becca, S. Yunoki, M. Fabrizio, and S. Sorella, *From Luttinger liquid to Mott insulator: the correct low-energy description of the one-dimensional Hubbard model by an unbiased variational approach*, Physical Review B 72, 085121 (2005).
39. M. Ferrero, F. Becca, M. Fabrizio, and M. Capone, *Dynamical behavior across the Mott transition of two bands with different bandwidths*, Physical Review B 72, 205126 (2005).
40. L. Spanu, F. Becca, and S. Sorella, *Theoretical constraints for the magnetic-dimer transition in two-dimensional spin models*, Physical Review B 73, 134429 (2006).
41. M. Capello, F. Becca, S. Yunoki, and S. Sorella, *Unconventional metal-insulator transition in two dimensions*, Physical Review B 73, 245116 (2006).
42. D. Poilblanc, F. Alet, F. Becca, A. Ralko, F. Trouselet, and F. Mila, *Doping quantum dimer models on the square lattice*, Physical Review B 74, 014437 (2006).
43. F. Vernay, A. Ralko, F. Becca, and F. Mila, *Identification of an RVB liquid phase in a quantum dimer model with competing kinetic terms*, Physical Review B 74, 054402 (2006).
44. A. Ralko, M. Ferrero, F. Becca, D. Ivanov, and F. Mila, *Dynamics of the quantum dimer model on the triangular lattice: Soft modes and local resonating valence-bond correlations*, Physical Review B 74, 134301 (2006).
45. M. Lugas, L. Spanu, F. Becca, and S. Sorella, *Finite compressibility in the low-doping region of the two-dimensional t - J model*, Physical Review B 74, 165122 (2006).
46. F. Mila, F. Vernay, A. Ralko, F. Becca, P. Fazekas, and K. Penc, *The emergence of resonating valence bond physics in spin-orbital models*, Journal of Physics: Condensed Matter 19, 145201 (2007).
47. S. Bissola, V. Lante, A. Parola, and F. Becca, *Magneto-elastic effects and magnetization plateaus in two dimensional systems*, Physical Review B 75, 184444 (2007).
48. F. Becca, L. Capriotti, A. Parola, and S. Sorella, *Exotic gapless spectrum induced by frustration in quantum antiferromagnets*, Physical Review B 76, 060401(R) (2007).
49. M. Capello, F. Becca, M. Fabrizio, and S. Sorella, *Superfluid to Mott-insulator transition in Bose-Hubbard models*, Physical Review Letters 99, 056402 (2007).

50. A. Ralko, M. Ferrero, F. Becca, D. Ivanov, and F. Mila, *Crystallization of the resonating valence bond liquid as vortex condensation*, Physical Review B **76**, 140404(R) (2007).
51. G. Seibold, F. Becca, and J. Lorenzana, *Theory of antibound states in partially filled narrow band systems*, Physical Review Letters **100**, 016405 (2008).
52. L. Spanu, M. Lugas, F. Becca, and S. Sorella, *Magnetism and superconductivity in the $t-t'-J$ model*, Physical Review B **77**, 024510 (2008).
53. F. Becca and M. Capello, *Variational approach for the superfluid-insulator transition in the bosonic Hubbard model*, Physica B **403**, 1293 (2008).
54. M. Capello, F. Becca, M. Fabrizio, and S. Sorella, *Mott transition in bosonic systems: Insights from the variational approach*, Physical Review B **77**, 144517 (2008).
55. L.F. Tocchio, F. Becca, A. Parola, and S. Sorella, *Role of backflow correlations for the non-magnetic phase of the $t-t'$ Hubbard model*, Physical Review B **78**, 041101(R) (2008).
56. G. Seibold, F. Becca, and J. Lorenzana, *Time-dependent Gutzwiller theory of pairing fluctuations in the Hubbard model*, Physical Review B **78**, 045114 (2008).
57. A. Ralko, F. Becca, and D. Poilblanc, *Magnetic field induced transition in a quantum magnet described by the quantum dimer model*, Physical Review Letters **101**, 117204 (2008).
58. M.E. Pezzoli, F. Becca, M. Fabrizio, and G.E. Santoro, *Local moments and magnetic order in the two-dimensional Anderson-Mott transition*, Physical Review B **79**, 033111 (2009).
59. F. Becca, L.F. Tocchio, and S. Sorella, *Metal-insulator transition and strong-coupling spin liquid in the $t-t'$ Hubbard model*, Journal of Physics: Conference Series **145**, 012016 (2009).
60. D. Heidarian, S. Sorella, and F. Becca, *Spin- $\frac{1}{2}$ Heisenberg model on the anisotropic triangular lattice: From magnetism to a one-dimensional spin liquid*, Physical Review B **80**, 012404 (2009).
61. L. Tocchio, A. Parola, C. Gros, and F. Becca, *Spin-liquid and magnetic phases in the anisotropic triangular lattice: the case of κ -(ET) $_2$ X*, Physical Review B **80**, 064419 (2009).
62. M.E. Pezzoli and F. Becca, *Ground-state properties of the disordered Hubbard model in two dimensions*, Physical Review B **81**, 075106 (2010).
63. L. 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*, Physical Review B **81**, 205109 (2010).
64. J. Carrasquilla, F. Becca, A. Trombettoni, and M. Fabrizio, *Characterization of the Bose-glass phase in low-dimensional lattices*, Physical Review B **81**, 195129 (2010). Selected for the Virtual Journal of Atomic Quantum Fluids, Vol. 2, Issue 6.
65. G. Carleo, F. Becca, S. Moroni, and S. Baroni, *Reptation quantum Monte Carlo for lattice Hamiltonians with a directed-update scheme*, Physical Review E **82**, 046710 (2010).
66. J. Carrasquilla and F. Becca, *Extracting the Mott gap from energy measurements in trapped atomic gases*, Physical Review A **82**, 053609 (2010).

Review Papers

1. F. Becca, L. Capriotti, A. Parola, and S. Sorella, *Variational wave functions for frustrated magnetic models*, in "Introduction to Frustrated Magnetism", ed. by C. Lacroix, P. Mendels, and F. Mila (Springer-Verlag Berlin Heidelberg, 2011).

Publications on Books

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