Luca Lepori

Universitá dell'Aquila
Dipartimento di Scienze Fisiche e Chimiche
via Vetoio, I-67010 Coppito-L'Aquila, Italia.

INFN, Laboratori Nazionali del Gran Sasso,
Via G. Acitelli, 22, I-67100 Assergi (AQ), Italy.

Education

University of Pisa, Italy : *Bachelor Degree in Physics*, obtained in the academic year 2003/2004 with a thesis titled: "An introduction to the electromagnetic field quantization".
Supervisor: Prof. Enore Guadagnini.
Final mark: 110/110.

University of Pisa, Italy : *Master Degree in Theoretical Physics*, obtained in the academic year 2004/2005 with a thesis titled: "Monopoles and exceptional groups".
Supervisor: Prof. Adriano di Giacomo.
Final mark: 110/110 *cum laude*.

SISSA/ISAS, Trieste, Italy: *Ph.D. in Statistical Physics*.
Admitted via european competition with written and oral exams.
Beginning in october 2006 in the Elementary Particle Physics Sector,
moving to the Statistical Physics Sector in October 2007.
Advisor: Prof. Giuseppe Mussardo (SISSA).
Coadvisor: Dr. Andrea Trombettoni (SISSA, CNR Trieste).
Final discussion on September 27th 2010.
Title of the PHD thesis: "QFT emerging models in condensed matter systems".
No final mark expected.
External referee: Prof. German Sierra Rodero (Instituto de Fisica Teorica UAM-CSIC, Madrid).

Past academic positions

01/06/2015 - 31/10/2016 : Post-doc researcher at Universitá di Padova, Italy. *Leaders*: Luca Salasnich, Luca Dell'Anna.

01/03/2013 - 31/05/2015 : Post-doc researcher at IPCMS-ISIS, France, Universite' de Strasbourg. *Leader*: Guido Pupillo.

01/01/2011 - 28/02/2013 : Post-doc researcher at Universitat Autonoma de Barcelona, Spain, Quantum Information group. *Leader*: Anna Sanpera Trigueroes.

Main research interests (order not meaningful)

- Quantum simulations on cold atoms/condensed matter devices, with application both to condensed matter physics (unconventional superconductivity/superfluidity, topological phases of matter) and to high-energy physics (relativistic systems and QFT models, gauge fields dynamics included).
- Methods and ideas from Quantum Computation applied to Condensed Matter Physics and to quantum simulation on condensed matter devices. Entanglement (entanglement entropy, entanglement spectrum) and its role in the study of phase transitions, unconventional phases of matter, and quantum simulation.
- Physics of (multi-)Weyl semimetals in 2D and 3D, topological and anomalous superfluid properties.
- Low-dimensional physics, low dimensional field theory, integrable models with applications to the study of quantum spin chains and generally of condensed matter systems.
- Long-range interacting 1D and 2D quantum systems: effects from nonlocality, appearance of new phases and universality classes, breakdown of conformal symmetry, new entanglement properties, role of long-rangedness on new features from non trivial topologies.

Main results achieved

For reference, see "Publications"

- proposal for the realization in ultra-cold fermionic mixtures of high-energy relevant phenomena, including Weyl and Dirac fermions [6], symmetry-locking phases ([11][22]), Majorana mass terms for spinors [30].
- proposal for a generalized approach to the study of chiral anomalies in semimetals [33].
- simulation of symmetry-protected topological phases by ultra-cold atoms with gauge potentials, including 2D-3D Weyl semi-metals ([6],[13],[15]) and multiple generalizations ([18]), 2D topological insulators ([13]).

- generalization of the abelian projection technique in QCD to exceptional Lie gauge groups ([2]-[5],[7]).
- analysis of the scaling and the distribution for the entanglement spectrum close a quantum phase transition ([8],[10]).
- co-author of a C-program simulating the Wess-Zumino-Witten theories [9].
- long-range generalizations of the Kitaev chains and relations with the long-range Ising model; discover on them of new types of phases, universality classes, edge states ([14],[16-17],[21],[24],[29]), transport properties [32].
- study of the consequences of long-rangedness in quantum systems on locality properties, correlation functions, universality classes, CFT breakdown, non equilibrium properties, entanglement content ([14],[16-17],[24],[26],[29]), transport properties [32].
- derivation of the infrared limit of long-range interacting systems ([17],[21],[29]).

Publications and preprints

- [**1**] L. Lepori, G. Mussardo, and G. Z. Toth, "The particle spectrum of the Tricritical Ising Model with spin reversal symmetric perturbations", J. Stat. Mech. **0809** P09004 (2008).
- [**2**] A. Di Giacomo, L. Lepori, and F. Pucci, "Homotopy, monopoles and 't Hooft tensor in QCD with generic gauge group", JHEP **0810** 096 (2008).
- [**3**] A. Di Giacomo, L. Lepori and F. Pucci, " 't Hooft tensor for generic gauge group", Nucl. Phys. Proc. Suppl. **186** 231 (2009) [arXiv:0809.2154 [hep-lat]].
  Prepared for the 14th High-Energy International Conference in Quantum Chromodynamics (QCD 08), Montpellier, France, 7-12th July 2008.
- [**4**] L. Lepori, G. Z. Toth, and G. Delfino, "Particle spectrum of the 3-state Potts model field theory: a numerical study", J. Stat. Mech. P11007 (2009).
- [**5**] C. Bonati, A. Di Giacomo, L. Lepori, and F. Pucci, "Monopoles, abelian projection and gauge invariance", Phys. Rev. D. 81, 0805022 (2010).
- [**6**] L. Lepori, G. Mussardo, and A. Trombettoni, "(3+1) massive Dirac fermions with ultracold atoms in frustrated optical lattices", Europhys. Lett. 92 50003 (2010).
- [**7**] C. Bonati, M. D' Elia, A. Di Giacomo, L. Lepori, F. Pucci, "Non Abelian Bianchi Identities, monopoles and gauge invariance", Lattice 2010, June 14-19th, Villasimius, Sardinia, Italy. Published in PoS(Lattice 2010), pag. 270.
- [**8**] G. De Chiara, L. Lepori, M. Lewenstein, and A. Sanpera, "Entanglement Spectrum, Critical Exponents and Order Parameters in Quantum Spin Chains", Phys. Rev. Lett. 109, 237208 (2012).
- [**9**] M. Beria, G. P. Brandino, L. Lepori, R. Konik, and G. Sierra, "Truncated Conformal Space Approach for perturbations of $SU(2)_k$ Wess-Zumino-Witten models", Nucl. Phys B 877 2, 457-483 (2013).

- **[10]** L. Lepori, G. De Chiara, and A. Sanpera, "Scaling of the entanglement spectrum near quantum phase transitions", Phys. Rev. B 87 235107 (2013).
- **[11]** L. Lepori, A. Trombettoni, and W. Vinci, "Simulation of two-flavors symmetry-locking phases in ultracold fermionic mixtures", Europhys. Lett. 109 50002 (2015).
- **[12]** G. Mazzucchi, L. Lepori, and A. Trombettoni, "Semimetal-superfluid quantum phase transitions in 2D and 3D lattices with Dirac points", J. Phys. B: At. Mol. Opt. Phys. 46 134014 (2013), Special Issue on Non Abelian Gauge Fields.
- **[13]** M. Burrello, I. C. Fulga, E. Alba, L. Lepori, and A. Trombettoni "Topological phase transitions driven by non-Abelian gauge potentials in optical square lattices", Phys. Rev. A 88, 053619 (2013).
- **[14]** D. Vodola, L. Lepori, E. Ercolessi, A. V. Gorshkov, and G. Pupillo, "Kitaev chains with long-range pairing", Phys. Rev. Lett. 113, 156402 (2014).
- **[15]** L. Lepori, I. C. Fulga, A. Trombettoni, and M. Burrello, "PT invariant Weyl semimetals in gauge symmetric systems", Phys. Rev. B. 94, 085107 (2016).
- **[16]** D. Vodola*, L. Lepori*, E. Ercolessi, and G. Pupillo, "Long-range Ising and Kitaev Models: Phases, Correlations and Edge Modes", New Journ. Phys., Volume 18, January 2016. Focus on Strongly interacting quantum gases in one dimension.
*: these authors contributed equally to the present paper.
- **[17]** L. Lepori, D. Vodola, G. Pupillo, G. Gori, and A. Trombettoni, "Effective theories and breakdown of conformal symmetry in an long-range quantum chain", Ann. Phys. 374 35-66 (2016).
- **[18]** L. Lepori, I. C. Fulga, A. Trombettoni, and M. Burrello, "Topological semimetals with double Weyl points and Fermi arcs in non-Abelian gauge potentials", Phys. Rev. A 94 053633 (2016).
- **[19]** L. Lepori and L. Salasnich, "Tunable zero and first sounds in ultracold Fermi gases with Rabi coupling", J. Stat. Mech. 043107 (2017).
- **[20]** L. Calabretta, M. Freddolini, M. Gulisano, P. Pasquetti, L. Lepori, and L. Barni, "Reduced pain in sedentary non-specific low back pain patients through aerobic exercise", not yet on the arXiv, accepted in "Topics in geriatric rehabilitation".
- **[21]** L. Lepori, A. Trombettoni, and D. Vodola, "Singular dynamics and emergence of nonlocality in long-range quantum models", Journ. Stat. Mech. 033102 (2017).
- **[22]** J. C. Pinto Barros, L. Lepori, and A. Trombettoni, "Phase diagram and non-Abelian symmetry locking for fermionic mixtures with unequal interactions", Phys. Rev. A 96 013603 (2017).
- **[23]** S. Carignano, L. Lepori, A. Mammarella, M. Mannarelli, and G. Pagliaroli, "Scrutinizing the pion condensed phase", Eur. Phys. Journ. A 53 35 (2017).
- **[24]** L. Lepori and L. Dell'Anna, "Long-range topological insulators and weakened bulk-boundary correspondence", New Journ. Phys. **19**, 103030 (2017).

- **[25]** M. Burrello, L. Lepori, S. Paganelli, and A. Trombettoni, "Abelian gauge potentials on cubic lattices", arXiv:1706.02228, published in the special issue "Advances in Quantum Mechanics: Contemporary Trends and Open Problems", ed. Alessandro Michelangeli and Gianfausto Dell'Antonio, Springer INdAM Series (2017).
- **[26]** L. Pezzé, M. Gabbrielli, L. Lepori, and A. Smerzi, "Multipartite entanglement in topological quantum phases", arXiv:1706.06539, accepted in Phys. Rev. Lett..
- **[27]** M. Burrello, C. Fulga, L. Lepori, and A. Trombettoni, "Exact diagonalization of cubic lattice models in commensurate Abelian magnetic fluxes and translational invariant non-Abelian potentials", J. Phys. A: Math. Theor. **50** 455301 (2017).
- **[28]** F. Lingua, L. Lepori, F. Minardi, V. Penna, and L. Salasnich, "Collision of impurities with Bose-Einstein condensates", arXiv:1707.09568.
- **[29]** L. Lepori, D. Giuliano, and S. Paganelli, "Edge insulating topological phases in a two-dimensional long-range superconductor", arXiv:1707.05777.
- **[30]** L. Lepori, A. Celi, A. Trombettoni, and M. Mannarelli, "Synthesis of Majorana mass terms in low-energy quantum systems", arXiv:1708.00281.
- **[31]** L. Lepori and M. Roncaglia, "Solvable 2D superconductors with l-wave pairing", arXiv:1709.08576 .
- **[32]** D. Giuliano, S. Paganelli, and L. Lepori, "Current transport properties and phase diagram of a Kitaev chain with long-range pairing", arXiv:1710.09022.
- **[33]** L. Lepori, M. Burrello, and E. Guadagnini, "Chiral anomalies in semimetals: a multiple derivation", submitted to Journal of High Energy Physics.

Other proceedings of conferences and cited preprints

- **[P1]** A. Di Giacomo, L. Lepori, and F. Pucci, "Homotopy, monopoles and 't Hooft tensor for generic gau(u)ge groups" [arXiv:0808.4041 [hep-lat]]. Not published (become paper [2] of the previous Section) but cited (5 times on arXiv on 07/11/2017).
- **[P2]** A. Di Giacomo, L. Lepori and F. Pucci, " 't Hooft tensor for generic gauge group", [arXiv:0809.4563 [hep-lat]].
  Prepared for the 34th International Conference of High Energy Physics 2008, Philadelphia.

Talks given in conferences, schools, research stays

- Speaker at SISSA, March 2009: "Colour confinement: ideas and methods from statistical physics", based on my research in collaboration with the lattice gauge group of Pisa University.
- Invited speaker at LAPTH Annecy (France), 8th April 2010: "Simulation of (3+1) Dirac fermions by ultracold atoms in optical lattices ".
- Speaker at joint ICTP-SISSA Statistical Physics seminar, Trieste, May 25-th 2010: "Simulation of massive (3+1) Dirac fermions by ultracold atoms in optical lattices ".
- Invited speaker at Max-Planck Institut fur Quantenoptik, Garching (Germany), 27-th July 2010: "Simulation of (3+1) Dirac fermions with ultracold atoms in optical lattices".
- Speaker at the conference "Quantum coherence and correlation in condensed-matter and cold-atoms systems", Evora, Portugal, 11th - 15th October 2010. Short talk: "Simulation of (3+1) Dirac fermions with ultracold atoms in optical lattices".
- Invited speaker at Universitá della Calabria, Cosenza (Italy), 18-th November 2010: "Simulation of (3+1) Dirac fermions with ultracold atoms in optical lattices".
- Invited speaker at Universidad Complutense de Madrid, 25-th November 2010: "Simulation of (3+1) Dirac fermions with ultracold atoms in optical lattices".
- Speaker at Universitat Autonoma de Barcelona, 5-th May 2011: "Simulation of (3+1) Dirac fermions with ultracold atoms in optical lattices".
- Invited speaker at Universitat de Barcelona, 3-rd July 2012: "New fun with QFT by ultra-cold atoms on optical lattices".
- Speaker at Universitat Autonoma de Barcelona, 24-th July 2012: "New fun with QFT by ultra-cold atoms on optical lattices".
- Invited speaker at Instituto de Fisica Teorica UAM/CSIC, Universidad Autonoma de Madrid, 22-th October 2012: "CFL locked phases and non abelian fractional vortices by ultracold atoms in optical lattices".
- Invited speaker at Institute for Quantum Optics and Quantum Information, Innsbruck, 8-th November 2012: "CFL locked phases and non abelian fractional vortices by ultracold atoms in optical lattices".
- Invited speaker at the workshop "Quantum Information and Quantum Phenomena Pyrenees Meeting 2013" (2nd edition), Espot, Lleida (Spain), 18-20th February 2013.
- Invited speaker at the Spring College of Complex Systems, ICTP, Trieste, 22th May 2013: "CFL locked phases and non abelian fractional vortices by ultracold atoms in optical lattices".
- Invited speaker at Lens, Firenze, 27th June - 28th June 2013: "CFL locked phases and non abelian fractional vortices by ultracold atoms in optical lattices".

- Invited speaker at University of Trento-BEC, Trento, 19th February 2014: "Long-range interacting Kitaev chains".
- Invited speaker at INRIM, Torino, 30th September 2014: "Long-range interacting Kitaev chains".
- Invited speaker at Scuola Normale Superiore, Pisa, 24th October 2014: "Long-range interacting Kitaev chains".
- Invited speaker at Gran Sasso Laboratories, L'Aquila, Italy, 17th February 2015: "Ultra-cold atoms as universal quantum simulators: symmetry-locked superfluid phases".
- Invited speaker at Universitá della Calabria, Cosenza (Italy), 9th June 2015: "Long-range interacting Kitaev chains".
- Invited speaker at Universitá della Calabria, Cosenza (Italy), 11th June 2015: "Ultra-cold atoms as universal quantum simulators: symmetry-locked superfluid phases".
- Speaker at Universita' di Padova, 4th November 2015: "Two key examples of long-range quantum chains".
- Invited speaker at Gran Sasso Laboratories, L'Aquila, Italy, 18th December 2015: "Unexpected effects in long-range quantum models".
- Invited speaker at Winter Workshop on Ultracold Quantum Matter, Padova, 11th January 2016: "Ultra-cold atoms as universal quantum simulators: symmetry-locked superfluid phases".
- Invited speaker at Politecnico Torino, Dipartimento di Scienza Applicata e Tecnologia, 17th March 2016: "Unexpected effects in long-range quantum models".
- Invited speaker at Universitá di Pisa, Dipartimento di Fisica, 5th May 2016: "Unexpected effects in long-range quantum models".
- Invited speaker at Universitá della Calabria, Cosenza (Italy), 30th June 2016: "Multi-Weyl semi-metals in synthetic gauge potentials".
- Invited speaker at Universitá dell'Aquila, L'Aquila (Italy), 7th December 2016: "An introduction to ultra-cold atoms". Tutorial, also for master and PhD students.
- Invited speaker at "From Static to Dynamical Gauge Fields with Ultracold Atoms", Galileo Galilei Institute for Theoretical Physics, Firenze, 22th May - 23th June 2017: "Long-range topological insulators and weakened bulk-boundary correspondence".
- Invited speaker at Universitá di Camerino, Camerino (Italy), 28th September 2017: "Long-range topological insulators and weakened bulk-boundary correspondence".
- Speaker at the conference "FisMat 2017", ICTP-SISSA Miramare Campus, Trieste, October 1-5st 2017: "Long-range topological insulators and weakened bulk-boundary correspondence".
- Speaker at Universitá dell'Aquila, L'Aquila (Italy), 9th October 2017: "Long-range topological insulators and weakened bulk-boundary correspondence".

Poster presentations in conferences and schools

- "Simulation of (3+1) Dirac fermions with ultracold atoms in optical lattices", poster session at "New frontiers in graphene physics" conference, ECT* European Center for Theoretical Studies in Nuclear Physics and Related Areas, Trento, 12-14th April 2010.
- "Simulation of (3+1) Dirac fermions with ultracold atoms in optical lattices", poster session at "Quantum coherence and correlation in condensed-matter and cold-atoms systems", Evora, Portugal, 11th-15th October 2010.
- "Simulation of (3+1) Dirac fermions with ultracold atoms in optical lattices", poster session at "Quantum coherence and correlation in condensed-matter and cold-atoms systems", Workshop "Quantum Simulation", Benasque, Spain, 28th February - 5th March 2011.
- "Scaling of the entanglement spectrum in the vicinity of the Haldane phase", poster session at the workshop "Quantum Optical Information Technology", Barcelona 5-7th October 2011.
- "Scaling of the entanglement spectrum in the vicinity of a critical point", poster session at the workshop "Topological states of matter", Freiburg 18-22th March 2012.
- "Fractional Vortices with Non-Abelian Modes in Ultracold Color-flavor Locked Phases", poster session at the workshop "Ultracold Atoms and Gauge Theories", International Center for Theoretical Physics, Trieste, 13-17th May 2013.
- "Long-range interacting Kitaev chains", poster session at the conferences "Progresses in quantum information and quantum simulation", Lyon, 17-19th November 2014.
- "Dynamics of Rabi-coupled and interacting two-components Fermi gas", poster session at the workshop "Frontiers in ultracold Fermi gases - 90 years after the "birth" of fermions in Florence", Galileo Galilei Institute, Firenze, 21-23th March 2016.

Grants and honours awarded

- January 2011: fellowship (3-6 years) of the FCT Fundacao Para a Ciencia e a Tecnologia, Ministerio da Ciencia, Tecnologia e Ensino Superior, Portugal. Amount of the grant per year: 19.000 euro (nets).
- November 2012: fellowship from the Angelo Della Riccia foundation, Florence (Italy). Fellowship for italian young researchers willing to make investigation in a foreign country. Elected research center: Universitat Autonoma de Barcelona, Group of Quantum Information and Quantum Phenomena, Barcelona, Spain. Total amount of the grant: 13.500 euro.

Collaboration with specialized reviews

Referee for Physical Review A/B/D/E, Physical Review Letters, Scientific Reports, and Nature Communications.

Didactic experiences

- Tutor for Master Thesis: A. Maraga, "Study of Rabi and Josephson coupled ultracold Fermi systems", Trento University and SISSA/ISAS (Trieste), academic year 2011/2012. Advisor: Prof. Andrea Trombettoni, SISSA/ISAS and CNR Trieste.
- Tutor for Master Thesis: G. Mazzucchi, "BCS-BEC crossover on layered Fermi-Hubbard model with Dirac points", Trento University and SISSA/ISAS (Trieste), academic year 2011/2012. Advisor: Prof. Andrea Trombettoni, SISSA/ISAS and CNR Trieste.
- Tutor for PhD thesis: D. Vodola, "Correlations and Quantum Dynamics of 1D Fermionic Models: New Results for the Kitaev Chain with Long-Range Pairing", University of Bologna and ISIS-IPCMS, University of Strasbourg, academic years 2012/2015. Advisors: Prof. Elisa Ercolessi (Univ. Bologna) and Prof. Guido Pupillo (Univ. Strasbourg).
- Tutor for PhD thesis: Joao Pinto Barros, "Field and Gauge Theories with Ultracold Atoms", SISSA (Trieste), academic years 2013/2017. Advisors: Prof. Andrea Trombettoni (CNR and SISSA, Trieste), and dott. Marcello Dalmonte (ICTP and SISSA, Trieste).

Languages

- Italian, mother tongue.
- English, fluent.
- French, basic level.
- Spanish, basic level.

Computer Skills

OS Good knowledge of Mac OS X and MS Windows, basic knowledge of Linux.

Programming Basic knowledge of FORTRAN, C, C++, MATLAB.

Typesetting Good knowledge of LaTeX and Beamer package.

Mathematics Good knowledge of Mathematica program.

Public Outreach

Organizer of the "Notte dei Ricercatori", Trieste, September 24th 2010, in the group "Ricercatori Erranti".
Co-author of the public document "Il futuro della ricerca" (The future of research).

Collaborators (past and present)

- Since 2006: University of Pisa, lattice gauge fields group, headed by professor Adriano di Giacomo.
- Since 2006: Dr. Fabrizio Pucci, Université Libre de Bruxelles.
- Since October 2007: Prof. Giuseppe Mussardo, SISSA, Trieste, Italy.
- Since October 2008: Prof. Gesualdo Delfino, SISSA, Trieste, Italy.
- Since October 2008: Dr. Gabor Zsolt Toth, Wigner RCP, Budapest, Hungary.
- Since April 2009: Dr. Andrea Trombettoni, SISSA, Trieste, Italy.
- Since October 2010 : Prof. German Sierra Rodero, Instituto de Fisica Teorica UAM/CSIC, Universidad Autonoma de Madrid.
- Since November 2010: Dr. Domenico Giuliano, Universitá della Calabria, Cosenza, Italy.
- Since November 2010: Prof. Robert Konik (Brookhaven National Laboratory), Upton, USA.
- Since November 2010: Dr. Giuseppe Piero Brandino, Amsterdam University.
- Since January 2011: Dr. Gabriele de Chiara, Quenn's University, Belfast, Ireland.
- Since January 2011: Prof. Anna Sanpera Trigueores, Universitat Autonoma Barcelona, Spain.
- Since March 2011: Dr. Alessio Celi, Instituto de Ciencies Fotoniques (ICFO), Castelldefels, Barcelona, Spain.
- Since November 2011: Dr. Michele Burrello, Lorentz Institute (Prof. Beenakker's group), Leiden, The Netherlands.
- Since January 2012: Dr. Walter Vinci, University College London, London, United Kingdom.
- Since June 2012: Dr. Gabriel Mazzucchi, Oxford University, United Kingdom.
- Since January 2013: Dr. Ion Cosma Fulga, Weizmann Institute of Science, Rehovot, Israel.
- Since March 2013: Prof. Guido Pupillo, Université de Strasbourg and CNRS, Strasbourg, France.
- Since March 2013: Prof. Elisa Ercolessi, Universitá di Bologna, Bologna, Italy.
- Since April 2013: Prof. Alexey Gorshkov, Joint Quantum Institute, NIST and University of Maryland, USA.
- Since May 2013: Dr. Marco Roncaglia, Politecnico di Torino, Torino, Italy.
- Since February 2014: Dr. Massimo Mannarelli, INFN-Gran Sasso Laboratory.

- Since January 2015: Dr. Giacomo Gori, SISSA, Trieste, Italy.
- Since June 2015: Prof. Luca Salasnich, Universitá di Padova, Padova, Italy.
- Since June 2015: Dr. Luca Dell'Anna, Universitá di Padova, Padova, Italy.
- Since September 2016: Dr. Simone Paganelli, Universitá dell'Aquila, L' Aquila, Italy.
- Since September 2016: Dr. Luca Pezzé, QSTAR, INO-CNR and LENS, Firenze, Italy.
- Since September 2016: Prof. Augusto Smerzi, QSTAR, INO-CNR and LENS, Firenze, Italy.
- Since September 2016: Prof. Enore Guadagnini, Universitá di Pisa, Pisa, Italy.

Academic References

Adriano di Giacomo
Emeritus professor of theoretical physics
Department of Physics "E. Fermi", University of Pisa
Largo B. Pontecorvo 3, 56127, Pisa, Italy
tel. +39 050 2214502
e-mail: digiaco@df.unipi.it

Domenico Giuliano
Researcher
Department of Physics, University of Calabria
Via P. Bucci, Arcavacata di Rende, Cosenza, Italy
tel. +39 0984 496029
e-mail: domenico.giuliano@fis.unical.it

Enore Guadagnini
Full professor of theoretical physics
Department of Physics "E. Fermi", University of Pisa
Largo B. Pontecorvo 3, 56127, Pisa, Italy
tel. +39 050 2214502
e-mail: enore.guadagnini@df.unipi.it

Alexey V. Gorshkov
Adjunct assistant professor of physics
Joint Quantum Institute, NIST/University of Maryland
2207 CSS Bldg, Univ of Maryland, College Park, MD 20742, USA
tel. +1 (301) 405-8934
e-mail: avgorshkov@gmail.com

Massimo Mannarelli
First Researcher
INFN-Gran Sasso National Laboratory
Via G. Acitelli 22, 67100 Assergi LAquila
tel. +39 0862 437743
e-mail: massimo@lngs.infn.it

Giuseppe Mussardo
Full professor of theoretical physics
SISSA/ISAS
Via Bonomea 265, 34151 Trieste, Italy
tel. +39 040 3787411
e-mail: mussardo@sissa.it

Anna Sanpera Trigueroes
ICREA professor of physics
Depart. Theoretical Physics
Universitat Autonoma Barcelona
08193 Bellaterra, Spain
phone:+ 34 935 812 843
e-mail: sanpera@ifae.es

German Sierra Rodero
Full professor of research
Instituto de Fisica Teorica UAM-CISC
C/ Nicols Cabrera 13-15
Universidad Autonoma de Madrid
Cantoblanco, 28049 Madrid, Spain.
phone: +34 91 299 9875
e-mail: german.sierra@uam.es

Andrea Trombettoni
Researcher
CNR and SISSA/ISAS, Trieste
Via Bonomea 265, 34151 Trieste, Italy
tel. +39 040 3787473
e-mail: andreatr@sissa.it