

Curriculum Vitae of German Sierra

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Personal Data

Name : Germán
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Nationality: Spanish
Date of Birth: 13 May 1955
Place of Birth: Caracas, Venezuela

Professional data

Organism : Consejo Superior de Investigaciones Cientificas (Spain)
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Academic Career

Graduate in Physics, Univ. Complutense de Madrid, Spain (1978).
PhD in Physics, Univ. Complutense de Madrid, Spain (1981).
Postdoc at l'Ecole Normale Superieure, Paris, France (1981 -1983).
Titular professor at Univ. Complutense de Madrid, Spain (1984 - 1987).
Fellow at CERN, Geneva, Switzerland (1987 - 1989).
Scientific researcher, CSIC, Spain (1989 - 2005).
Professor of research, CSIC, Spain (2005 - 2014).

Publications

From Web of Science: 136 articles, 3.871 citations and h-index: 31.

Articles (2010-2014)

- [1] "From conformal to volume-law for the entanglement entropy in exponentially deformed critical spin 1/2 chains", Giovanni Ramirez, Javier Rodriguez-Laguna, German Sierra; J. Stat. Mech. (2014) P10004; arXiv:1407.3456.
- [2] "Construction of spin models displaying quantum criticality from quantum field theory", Ivan Glasser, J. Ignacio Cirac, German Sierra, Anne E. B. Nielsen; Nucl. Phys. B **886**, 63-74 (2014); arXiv:1405.4135.
- [3] "Quantum spin models for the $SU(n)_1$ Wess-Zumino-Witten model", Hong-Hao Tu, Anne E. B. Nielsen, German Sierra; Nucl. Phys. B **886**, 328 (2014) arXiv:1405.2950
- [4] "The Riemann zeros as energy levels of a Dirac fermion in a potential built from the prime numbers in Rindler spacetime", German Sierra, J. Phys. A: Math. Theor. **47**, 325204 (2014); **IOP Select.** arXiv:1404.4252.
- [5] "There is entanglement in the primes" Jose Ignacio Latorre, German Sierra; accepted in Quantum Information and Computation, arXiv:1403.4765.
- [6] "Entanglement in low-energy states of the random-hopping model", Giovanni Ramirez, Javier Rodriguez-Laguna, German Sierra; J. Stat. Mech. (2014) P07003; arXiv:1402.5015.

- [7] "Bosonic fractional quantum Hall states on the torus from conformal field theory", Anne E. B. Nielsen, German Sierra; J. Stat. Mech. (2014) P04007; arXiv:1312.5134.
- [8] "Optical lattice implementation scheme of a bosonic topological model with fermionic atoms" Anne E. B. Nielsen, German Sierra, J. Ignacio Cirac; Phys. Rev. A **90**, 013606 (2014); arXiv:1311.7684.
- [9] "Lattice Laughlin States of Bosons and Fermions at Filling Fractions $1/q$ ", Hong-Hao Tu, Anne E. B. Nielsen, J. Ignacio Cirac, German Sierra; New J. Phys. **16**, 033025 (2014); arXiv:1311.3958.
- [10] "Energy space entanglement spectrum of pairing models with s-wave and p-wave symmetry", Javier Rodríguez-Laguna, Miguel Ibáñez Berganza, German Sierra; Phys. Rev. B **90**, 041103 (2014); arXiv:1307.8363.
- [11] "Fractional quantum Hall states in lattices: Local models and physical implementation", Anne E. B. Nielsen, German Sierra, J. Ignacio Cirac; Nature Communications **4**, 2864 (2013) arXiv:1304.0717.
- [12] "Quantum Computation of Prime Number Functions", José I. Latorre, German Sierra; Quantum Information and Computation, **14**, 0577 (2014); arXiv:1302.6245.
- [13] "Entanglement Entropies in Conformal Systems with Boundaries", L. Taddia, J. C. Xavier, F. C. Alcaraz, G. Sierra, Phys. Rev. B **88**, 075112 (2013); arXiv:1302.6222.
- [14] Truncated Conformal Space Approach for Perturbed Wess-Zumino-Witten $SU(2)_k$ Models M. Beria, G. P. Brandino, L. Lepori, R. M. Konik, G. Sierra; Nucl. Phys. B **877** [FS] 457 (2013); arXiv:1301.0084.
- [15] "An xp model on AdS_2 spacetime"; Javier Molina-Vilaplana, German Sierra; Nucl. Phys. B **877**, 107 (2013); arXiv:1212.2436.
- [16] "Laughlin spin liquid states on lattices obtained from conformal field theory", A. E. B. Nielsen, J. I. Cirac, G. Sierra, Phys. Rev. Lett. **108**, 257206 (2012); arXiv:1201.3096.
- [17] "Qubism: self-similar visualization of many-body wavefunctions", J. Rodriguez-Laguna, P. Migdal, M. Ibanez Berganza, M. Lewenstein, G. Sierra, New J. Phys. **14** 053028 (2012); arXiv:1112.3560.
- [18] "General covariant xp models and the Riemann zeros", G. Sierra, J. Phys. A: Math. Theor. **45** 055209 (2012); arXiv:1110.3203.
- [19] "Entanglement of excited states in critical spin chains", M. Ibanez Berganza, F. C. Alcaraz, G. Sierra, J. Stat. Mech. P01016 (2012); arXiv:1109.5673.
- [20] "Quantum spin Hamiltonians for the $SU(2)_k$ WZW model" A. E. B. Nielsen, J. I. Cirac, G. Sierra, J. Stat. Mech. P11014 (2011), arXiv:1109.5470.
- [21] "The $H=xp$ model revisited and the Riemann zeros", G. Sierra, J. Rodriguez-Laguna, Phys. Rev. Lett. **106**, 200201 (2011); arXiv:1102.5356.
- [22] "Entanglement of low-energy excitations in Conformal Field Theory" F. C. Alcaraz, M. Ibanez Berganza and G. Sierra, Phys. Rev. Lett. **106**, 201601 (2011); arXiv:1101.2881
- [23] "Violation of the area law and long range correlations in infinite matrix product states", Anne E. B. Nielsen, German Sierra, J. Ignacio Cirac, Phys. Rev. A **83**, 053807 (2011); arXiv:1103.2205.
- [24] "Chiral correlators of the Ising conformal field theory", E. Ardonne, G. Sierra; J. Phys. A. **43**, 505402 (2010), **IOP Select**; arXiv:1008.2863.
- [25] "Entanglement entropy of integer Quantum Hall states in polygonal domains", I. D. Rodriguez and G. Sierra, J. Stat. Mech. (2010) P12033; arXiv:1007.5356
- [26] "Exact solution of the p+ip pairing Hamiltonian and a hierarchy of integrable models" C. Dunning, M. Ibanez, J. Links, G. Sierra, S.-Y. Zhao, J. Stat. Mech. (2010) P08025; arXiv:1001.1591
- [27] "Infinite matrix product states, Conformal Field Theory and the Haldane-Shastry model" J. I. Cirac and G. Sierra, Phys. Rev. B **81**, 104431 (2010); arXiv:0911.3029.

Books

- [28] "Quantum electron liquids and high- T_c superconductivity", J. González, M.A. Martín-Delgado, G. Sierra, A. H. Vozmediano, Lecture Notes in Physics vol. **m38**, Springer-Verlag, 1995.
- [29] "Quantum Groups in two-dimensional Physics", C. Gómez, M. Ruiz-Altaba, G. Sierra, Cambridge Monographs on Mathematical Physics, Cambridge University Press, London, 1996.

Talks at Congresses (2010-2014)

- 'Quantum Information Concepts for Condensed Matter Problems', at the Max-Planck Institute for Physics of Complex Systems. Organized by Ian Affleck (UBC, Vancouver), Masud Haque (MPI-PKS Dresden) and Ulrich Schollwoeck (LMU, Munich). Dresden, Germany, 14-25 June 2010.
- "Kavli Royal Society International Meeting on Topology and Physics". Organized by Jiannis K. Pachos (University of Leeds). Checheley Hall, London, 14-17 July 2010.
- "International Workshop on Density Matrix Renormalization Group and Other Advances in Numerical Renormalization Group Methods". Organized by X. Wang (Renmin University of China) and T. Xiang (Chinese

Academy of Sciences). Beijing, China, August 3- September 23, 2010.

- "Third Iberian Mathematical Meeting". Organized by M. Abreu (SMP). Braga, Portugal, 1-3 October 2010.
- Workshop on "Quantum coherence and correlations in condensed-matter and cold-atom systems". Organized by J. Carmelo (University of Evora). Evora, Portugal, 11-15 October 2010.
- Workshop "What is Quantum Field Theory?", Organized by M. Asorey et al. (U. Zaragoza), 2011, Sep 14 – Sep 18 (Benasque, Spain).
- Workshop on "Advanced Conformal Field Theory". Organized by P. Fendley, H. Saleur, V. Schomerus, S. H. Simon, N. Read and J. Jacobsen. Institut Henri Poincare, Paris, France, 1-31 Oct 2011.
- Workshop on "Topological Quantum Computation", Organized by K. Schoutens. The Institute of Physics, University of Amsterdam, The Netherlands, 6-7 Feb 2012.
- Workshop on "New quantum states of matter in and out of equilibrium". Organized by I. Affleck (U. British Columbia), P. Calabrese (Pisa University), J. Cardy (U. Oxford), F. H. L. Essler (U. Oxford), E. Fradkin (U. Illinois at Urbana-Champaign), F. D. M. Haldane (Princeton University). Galileo Galilei Institute for Theoretical Physics (GGI). Florence, Italy, April 2012.
- XXXV Encontro Nacional de Física da Matéria Condensada. 14 - 18 May 2012, Águas de Lindóia, Sao Paulo, Brasil.
- Workshop on "Quantum Simulations with Ultracold Atoms". Organized by I. Bloch, M. Inguscio, M. Lewenstein, G. Mussardo and A. Trombettoni, ICTP, Trieste, Italy, 16-20 July 2012.
- Workshop on "The Beauty of Integrability: low-dimensional Physics, Statistical Models and Solitons". Organized by F. Alcaraz (U. de So Paulo, Brazil), G. Mussardo (SISSA-ICTP, Trieste, Italy) P. Pearce (U. Melbourne, Australia). The International Institute of Physics (IIP), Federal University of Rio Grande do Norte, Natal, Brasil, 15-28 July 2012.
- Workshop on Advances in Quantum Technology: From Quantum Information to Quantum Devices The International Institute of Physics, Natal, Brazil, August 2012.
- Workshop on "Disordered and Topological Systems". Organized by Ravin Bhatt (Princeton University), Ming-Chiang Chung (Chung-Hsing University), Xin Wan (Zhejiang University) Zhejiang University, Hangzhou, China, March 18-22, 2013
- Workshop on "Quantum Physics: from fundamental questions to applications". Organized by I. Cirac and M. Lewenstein. Casa de la Pedrera, ICFO, Barcelona, Spain, May 22-24.
- Workshop on "Quantum Many Body Systems in Low Dimensions: Theory and Experiment". Organized by Xiwen Guan, Zong-Chao Yan, Chao-Hong Lee, Murray T Batchelor, Chengbin Li, Li-Juan Liu. Wuhan Institute of Physics and Mathematics, Chinese Academy of Science, Wuhan, China, 19-21 June 2013.
- Workshop on "Topological Phases in Condensed Matter and Cold Atom Systems: towards quantum computations". Organized by D. Poilblanc (CNRS & Univ. de Toulouse, FR), E. Ardonne (Stockholm University, SE), N. Regnault (ENS, FR & Princeton Univ., US), M. Troyer (ETH Zurich, CH). Institut d'Etude Scientifique de Cargèse (IESC), France, June 24 to July 6, 2013.
- 1st i-Link Workshop Macro-from-Micro: Quantum Gravity and Cosmology. Organized by G. Calcagni (IEM-CSIC), G. A. Mena Marugn (IEM-CSIC), M. Fernández-Méndez (IEM-CSIC). Madrid, Septiembre 2013.
- Workshop on "Perspectives on Quantum Many-Body Entanglement". Organized by Román Orús (JGU Mainz) and Matteo Rizzi (JGU Mainz). Johannes-Gutenberg Universität, Mainz, Germany, September 2013.
- Workshop on "Tensor Networks and Simulations". Organized by J. Ignacio Cirac and Frank Verstraete. Simons Institute for the Theory of Computing at Berkeley University (USA). April 21 to 25 (2014).
- Workshop on "Entanglement Entropy in Many Body Quantum Systems". Organized by Olalla Castro-Alvaredo and Benjamin Doyon. King's College London and City University London, 2-4 June 2014.
- Tercer Encuentro Conjunto de la Real Sociedad Matemática Española y la Sociedad Matemática Mexicana., Zacatecas, México, 1-5 Sept 2014.
- 9th Bologna Workshop in CFT and Integrable Models. Organized by F. Ravanini. Bolonia, Italy, 15-18 Oct 2014.

Organization of workshops

- XVIII International GIFT Seminar on “Strings and Superstrings”. El Escorial, Madrid, 1987. Coorganizers: J. Ramírez Mittelbrunn (UCM) and M. Ramon Medrano (UCM).
- Universidad Complutense Summer School on “Strongly Correlated Magnetic and Superconducting Systems”. El Escorial, Madrid, 1996. Coorganizer: M. A. Martín-Delgado (UCM).
- Journeys on “Quantum Field Theory in Low Dimensional Systems and Condensed Matter”, Instituto de Ciencias de Materiales CSIC. Cantoblanco, Madrid, 1996. Coorganizers: F. Guinea (CSIC), C. Tejedor (UAM), L. Brey (CSIC), G. Gómez-Santos (UAM), G. Sierra (CSIC) y M.A. Martín Delgado (UCM).
- “Advanced Seminar on Field Theoretical Methods in Condensed Matter Physics”. Girona, Spain , 2001. Coorganizer: D. Espriu (U Barcelona).
- “INSTANS Summer School”, Centro de Ciencias de Benasque (Huesca, Spain), 2010. Coorganizers: G. Mussardo (SISSA), K. Schoutens (ITFA).
- “Quantum Mechanics, Operator Theory and the Riemann Zeta function”. Centro de Ciencias de Benasque (Huesca, Spain), 2012. Coorganizers: J.P. Keating (U. Bristol, UK), J.C. Lagarias (U. Michigan, USA).
- “Entangle This: strings, fields and atoms”, IFT UAM-CSIC, 2012 November 19-21, Madrid, Spain. Coorganizers: Esperanza Lopez (IFT), Jose Barbon (IFT) and Karl Landsteiner (IFT).
- Workshop on “Quantum Integrability, Conformal Field Theory and Topological Quantum Computation”, Natal, Brasil. 2014. Coorganizers: F. C. Alcaraz (Sao Carlos, Brazil); F. H. L. Essler, (Oxford, UK); G. Mussardo, (Trieste, Italy) and Rodrigo Pereira, (Sao Carlos, Brazil);

Teaching (2010-2014)

- “Quantum Entanglement”, Master in Theoretical Physics, UAM, and U. de Zaragoza, years: 2010, 2011 and 2012.
- Mathematica Summer School on Theoretical Physics devoted to the subject “2D Physics in Condensed Matter”. Organized by Pedro Vieira (Perimeter Institute). Porto, Portugal, 11- 16 July 2010.
- School in Mathematical-Physics on “Conformal Field Theories with Applications”. Univ. de los Andes, Bogotá, Colombia, May 16-20 , 2011.
- Lectures at the Winter PhD School on Statistical Field Theory, The Galileo Galilei Institute for Theoretical Physics Arcetri, Florence, Italy. 3-14 Feb, 2014. Organizers: P. Calabrese, A. Cappelletti, F. Colomo, G. Mussardo.

Other merits

- National Award in undergraduate physical sciences. Ministry of Education in Spain (1980).
- Extraordinary prize in physical sciences Ph.D. Universidad Complutense of Madrid (1981).
- Fellow at CERN, Geneva, Switzerland (1987 - 1989).
- Editor of “Journal of Statistical Mechanics: Theory and Experiment” JSTAT (from 2004) and the “Journal of High Energy Physics” JHEP (from 2012).
- Coordinator of the National Assessment Agency and Foresight (ANEP) in the area of Physics and Space Sciences (2004 - 2006).
- Vicedirector of the Institute of Theoretical Physics UAM/CSIC (2007 - 2009).
- Member of the Committee of the area of “Physical science and technologies” at CSIC (July 2008 - April 2012).
- Director of 5 PhD thesis.