



Gian Francesco Giudice

Curriculum Vitae

Personal data

Born in Padua on 25 January 1961, Italian nationality, married with two children.

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Education

1988 **Doctor Philosophiæ**, *Summa cum laude*, International School for Advanced Studies, Trieste, Italy.

1986 **Magister Philosophiæ**, *Summa cum laude*, International School for Advanced Studies, Trieste, Italy.

1984 **Bachelor in physics**, *Summa cum laude*, University of Padua, Italy.

Employment

Since 2016 **Head of the Theoretical Physics Department**, CERN, Geneva, Switzerland.

Since 1994 **Research Staff at the Theoretical Physics Department**, CERN, Geneva, Switzerland.

1993–1994 **Research Fellow at the Theoretical Physics Department**, CERN, Geneva, Switzerland.

1991–1994 **Researcher**, National Institute for Nuclear Physics (INFN), Italy.

1990–1992 **Postdoctoral Research Fellow**, University of Texas at Austin, USA.

1988–1990 **Research Associate**, Fermi National Accelerator Laboratory (Fermilab), USA.

Research fields

High-energy particle physics.

Theories beyond the Standard Model, supersymmetry, spatial extra dimensions, Higgs boson physics, search for new particles at high-energy colliders.

Low-energy particle physics.

Search for new physics in decays and rare processes, test of gravity at small distances, neutrino physics.

Cosmology.

Origin of dark matter, inflation, phase transitions in the early universe, baryogenesis, microlenses and gravitational waves.

Most significant contributions

Supersymmetric theories.

- Proposal of a criterium to quantify the degree of naturalness in a supersymmetric theory.
- Solution of the μ problem in supergravity.
- Method to compute quantum corrections through analytic continuation in superspace.
- Studies of theories with Gauge Mediation.
- Studies of theories with Anomaly Mediation.
- Studies of theories with Split Supersymmetry.

Theories in extra dimensions.

- Method to describe the interactions of gravitons in spaces with extra dimensions.
- Mixing of the Higgs boson with spin-zero components of extra-dimensional gravitons.
- Transplanckian collisions.

Flavour physics.

- Method to search for new physics through Wilson coefficients.
- Quantum corrections to the decay $b \rightarrow s\gamma$.
- Proposal of Minimal Flavor Violation.

Higgs boson physics.

- Formulation of the composite Higgs effective theory.
- Study of the cosmological implications of the Higgs potential instability.
- Mechanisms for a cosmological selection of the Higgs mass.

Cosmology.

- New models of dark matter particles.
- Higgs effect in dark matter detection through spin-independent processes.
- Non-thermal particle production during the last stages of inflation.
- Calculation of thermal corrections to leptogenesis.

Publications

210 articles, published in the most prestigious international scientific journals.

h-index = 95, from Inspire HEP bibliographical data.

Selection of some representative publications.

- Upper Bounds on Supersymmetric Particle Masses, Nucl.Phys.B 306 (1988) 63 [Citations: 1374]
- A Natural Solution to the μ Problem in Supergravity Theories, Phys.Lett.B 206 (1988) 480 [Citations: 1010]
- Some New Aspects of Supersymmetry R-Parity Violating Interactions, Phys.Rev.D 40 (1989) 2987 [Citations: 652]
- $b \rightarrow s\gamma$ decay and supersymmetry, Phys.Lett.B 309 (1993) 86 [Citations: 384]
- Naturalness constraints in supersymmetric theories with nonuniversal soft terms, Phys.Lett.B 357 (1995) 573 [Citations: 631]
- The μ problem in theories with gauge mediated supersymmetry breaking, Nucl.Phys.B 478 (1996) 31 [Citations: 319]
- Extracting supersymmetry breaking effects from wave function renormalization, Nucl.Phys.B 511 (1998) 25 [Citations: 323]
- Next-to-leading QCD corrections to $B \rightarrow X_s\gamma$: Standard model and two Higgs doublet model, Nucl.Phys.B 527 (1998) 21 [Citations: 453]
- Theories with gauge mediated supersymmetry breaking, Phys.Rept. 322 (1999) 419 [Citations: 1708]
- Gaugino mass without singlets, JHEP 12 (1998) 027 [Citations: 1525]
- Quantum gravity and extra dimensions at high-energy colliders, Nucl.Phys.B 544 (1999) 3 [Citations: 1220]
- Phenomenological consequences of supersymmetry with anomaly induced masses, Nucl.Phys.B 559 (1999) 27 [Citations: 453]
- Gravitational scalars from higher dimensional metrics and curvature Higgs mixing, Nucl.Phys.B 595 (2001) 250 [Citations: 393]
- Largest temperature of the radiation era and its cosmological implications, Phys.Rev.D 64 (2001) 023508 [Citations: 506]
- $B \rightarrow X_s\gamma$ in supersymmetry: Large contributions beyond the leading order, JHEP 12 (2000) 009 [Citations: 437]
- Minimal flavor violation: An effective field theory approach, Nucl.Phys.B 645 (2002) 155 [Citations: 1676]
- Towards a complete theory of thermal leptogenesis in the SM and MSSM, Nucl.Phys.B 685 (2004) 89 [Citations: 814]
- Split supersymmetry, Nucl.Phys.B 699 (2004) 65 [Citations: 987]
- Aspects of split supersymmetry, Nucl.Phys.B 709 (2005) 3 [Citations: 695]
- The well-tempered neutralino, Nucl.Phys.B 741 (2006) 108 [Citations: 478]
- The Strongly-Interacting Light Higgs, JHEP 06 (2007) 045 [Citations: 993]
- Flavour physics of leptons and dipole moments, Eur.Phys.J.C 57 (2008) 13 [Citations: 407]
- Probing High-Scale and Split Supersymmetry with Higgs Mass Measurements, Nucl.Phys.B 858 (2012) 63 [Citations: 314]
- Higgs mass implications on the stability of the electroweak vacuum, Phys.Lett.B 709 (2012) 222 [Citations: 513]
- Higgs mass and vacuum stability in the Standard Model at NNLO, JHEP 08 (2012) 098 [Citations: 1467]
- Investigating the near-criticality of the Higgs boson, JHEP 12 (2013) 089 [Citations: 1210]
- What is the $\gamma\gamma$ resonance at 750 GeV?, JHEP 03 (2016) 144 [Citations: 395]
- A Clockwork Theory, JHEP 02 (2017) 036 [Citations: 162]
- Deciphering the Nature of the Higgs Sector, CYRM (2017) 2 [Citations: 1533]

- Long-Lived Particles at the Energy Frontier: The MATHUSLA Physics Case, Rept.Prog.Phys. 82 (2019) 11 [Citations: 265]
- FCC Physics Opportunities, Eur.Phys.J.C 79 (2019) 6 [Citations: 410]
- The Selfish Higgs, JHEP 10 (2019) 199 [Citations: 28]
- Physics Briefing Book : Input for the European Strategy for Particle Physics Update 2020, CERN-ESU-004 [Citations: 144]
- Self-Organised Localisation, JHEP 10 (2021) 093 [Citations: 16]

Lectures, seminars and colloquia

Numerous lectures in physics schools around the world; speaker in the main international conferences in particle physics and cosmology; frequent seminars and colloquia in universities and research institutes.

Selection of some lectures or seminars.

- "Self-Organised Localisation", Stanford University, 15 November 2021.
- "Closing Talk", 9th Conference on Large Hadron Collider Physics (LHCP2021), Paris, 7-12 June 2021.
- "Looking into the future of high-energy collider physics", Yuval Ne'eman Memorial Lecture, Tel Aviv University, 30 May 2021.
- "Naturalness and the future of high-energy physics", GGI Focus Meeting, 19 May 2021.
- "What more particle physics has to teach cosmology?", Cosmic Controversies, Chicago, 5-8 October 2019.
- "From Higgs to the Cosmos: a journey in the particle world", Higgs Lecture, University of Edinburgh, 27 March 2019.
- "Black holes to the eyes of a particle physicist", Lectio Magistralis for the 2018 SISSA opening ceremony, 5 November 2018.
- "The future of theoretical particle physics", inaugural lecture of the GGI Centre for Advanced Studies, 15 February 2018.
- " pp theory at 100 TeV", ICFA Symposium, Ottawa, 6-9 November 2017.
- "Gravitational waves from a particle-physics perspective", LIGO-Virgo Meeting, 1 September 2017.
- "The LHC & the Universe", 28th Texas Symposium on Relativistic Astrophysics, 13-18 December 2015.
- "MultiTeV Probes of the Standard Model and Beyond", Cargese International School for Theoretical Particle Physics, 14-26 July 2014.
- "What did we learn from the BEH mass?", Opening Lecture Solvay Institute, Bruxelles, 28 November 2013.
- "Naturalness after LHC8", 2013 Europhysics Conference on High Energy Physics (EPS-HEP 2013), Stockholm, 18-24 July 2013.
- "Lessons from the LHC", Opening Lecture at the International Workshop on Discovery Physics at the LHC, Kruger, South Africa, 3-7 December 2012.
- "Summary Talk", Physics at LHC, Vancouver, 4-9 June 2012.
- "Particles and Fields", 25th Solvay Conference on Physics "The Theory of the Quantum World" on the occasion of the 100th anniversary of the First Conseil de Physique Solvay, Bruxelles, 19-22 October 2011.
- "Theoretical Physics to face the challenge of LHC", LCVII École de Physique, Les Houches, 1-26 August 2011.
- "Colliders & Cosmology", Neutrino Oscillations in Venice, 15-18 April 2008.
- "Implications of the Higgs Discovery", IPMU Opening Symposium, Tokyo, 11 March 2008.
- "Theories for the Fermi Scale", 2007 Europhysics Conference on High Energy Physics (EPS-HEP 2007), Manchester, 19-25 July 2007.
- "String Theory and the Real World", LXXXVII École de Physique, Les Houches, 2-27 July 2007.
- "Supersymmetry, Naturalness and Environmental Selection", SUSY06, Irvine, 12-17 June 2006.
- "The Physics Landscape", Open Symposium on European Strategy for Particle Physics, Orsay, 30 January - 1 February 2006.
- "Theoretical Predictions for Collider Searches", 21st International Symposium on Lepton and Photon Interactions at High Energies, Fermilab, 11-16 August 2003.
- "Physics in Extra Dimensions", Fifth Nordic Physics Norfa School, Helsinki, May 2002.
- "Extra Dimensions and Quantum Gravity at Collider Energies", Higgsfest, Edinburgh, 11 April 2000.
- "Recent Developments in Physics Beyond the Standard Model", 19th International Symposium on Lepton and Photon Interactions at High Energies, Stanford, 9-14 August 1999.
- "Building Supersymmetric Models", School on Trends in Theoretical Physics, La Plata, Argentina, May 1997.
- "Beyond the Standard Model", European School of High Energy Physics, Dubna, Russia, September 1995.

Scientific community service

Coordinator and participant in study groups for the main projects in high-energy physics (LEP, Tevatron, LEP2, European Neutrino Factory Complex, CLIC, SuperB Factory, LHC, TLEP, SHiP, FCC-ee, FCC-hh, MATHUSLA, CEPC, HL-LHC, HE-LHC, AEDGE, FIPs).

Organiser of numerous conferences at CERN and member of the Advisory Committees of about a hundred international conferences.

CERN Coordinator of 6 research and education networks funded by the European Community ("AstroParticleNet", "Supersymmetry and the Early Universe", "LHC Physics", "Quest for Unification", "Elusives", "InvisiblesPlus").

2000–2013 Member of the European Committee for Future Accelerator (ECFA).

2003–2006 Chairman of the CERN Academic Training Committee.

2006–2010 Consultant of the Particle Data Group.

2011–2016 Scientific member of the LHC Committee.

2013–2016 Member of the Board of Representatives of the Theoretical Astroparticle Physics "European Integrated Infrastructure".

2018–2020 Member of the Physics Preparatory Group of the European Strategy for Particle Physics, as CERN representative.

Dal 2019 Co-founder and member of the Steering Committee of the European Consortium for Astroparticle Theory (EuCAPT).

Editorial activity

Since 2000 **Scientific editor**, *Physics Letters B*, Elsevier Publishing Company.

2003–2006 **Scientific editor**, *The Journal of High Energy Physics (JHEP)*, Springer Verlag.

Dal 2007 **Scientific member**, CERN Reports Editorial Board.

Dal 2012 **Scientific Advisor**, *The Journal of High Energy Physics (JHEP)*, Springer Verlag.

Scientific review committees

- Agence Nationale de la Recherche (ANR), France
- Agencia Nacional de Evaluación y Prospectiva (ANEP), Ministerio de Economía y Competitividad, Spain
- Agenzia Nazionale di Valutazione del Sistema Universitario e della Ricerca (ANVUR)
- Istituto Nazionale di Fisica Nucleare (INFN)
- European Research Council (ERC), European Community
- Research Executive Agency (REA), European Community
- Danmarks Grundforskningsfond, Danish National Research Foundation, Denmark
- US-Israel Binational Science Foundation, United States and Israel
- Israel Science Foundation (ISF), Israel
- German-Israeli Foundation for Scientific Research and Development (GIF), Germany and Israel
- New Eurasia Foundation (FNE), Russia
- Swiss National Science Foundation, Switzerland
- Ministry of Education and Science of the Russian Federation, Russia
- National Science Foundation (NSF), USA
- Tata Institute of Fundamental Research, National Centre for Nuclear Science and Mathematics, India
- Visiting Review Committee, Université Claude Bernard, Lyon, France
- Visiting Review Committee, University of Southern Denmark, Odense, Denmark
- Fund Selection Committee, Mainz Institute for Theoretical Physics (MITP), Germany
- Russian Science Foundation (RSF), Russia
- External Scientific Committee, Institut de Física d'Altes Energies (IFAE), Barcelona, Spain
- National Science Centre, Poland
- Physical Sciences Panel, Research Grants Council, Hong Kong
- Review Panel, Deutsches Elektronen-Synchrotron (DESY), Hamburg, Germany
- Contact Office for European Research Innovation and Education (SwissCore), Switzerland
- International Scientific Advisory Board, National Institute of Chemical Physics and Biology, Tallinn, Estonia
- 5-year Review Panel, Higgs Centre for Theoretical Physics, University of Edinburgh, United Kingdom
- MIAPP Program Committee, Munich Institute for Astro and Particle Physics, Germany
- Member of the Advisory Board of the Scuola Normale Superiore, Pisa
- Grant Selection Panel, Fundação para a Ciência e Tecnologia (FCT), Portugal

- Member of the Scientific Advisory Committee of the Perimeter Institute for Theoretical Physics
- JINR International Strategic Working Group, Dubna, Russia

Recognitions

- 1987 **Prize Fondazione Aldo Gini**, Padua.
- 1987 **Prize Fondazione Angelo Della Riccia**, Florence.
- Since 2011 **Academician of the Istituto Veneto di Scienze, Lettere ed Arti**, Venice.
- 2013 **Jacques Solvay Chair in Physics**, *International Solvay Institutes*, Bruxelles.
- Since 2013 **Academician of the Accademia Galileiana**, Padua.
- 2019 **Distinguished Visiting Research Chair**, *Perimeter Institute for Theoretical Physics*, Canada.
- 2020 **Sackler Distinguished Lecturer**, *Tel Aviv University*, Israel.
- 2022 **Chandrasekhar Lecturer**, *Tata Institute of Fundamental Research*, Mumbai, India.
- Since 2022 **Academician of the Accademia dei Lincei**, Rome.
- 2023 **Erwin-Schrödinger Guest Professor**, *University of Vienna*, Austria.

Scientific outreach

- Participation to public events, scientific festivals, radio and TV programmes and podcasts.
- Articles in Italian newspapers (la Repubblica, Il Sole 24 Ore).
- Author of *A Zeptospace Odyssey*, a popular-science book on the LHC, the CERN particle collider, published in English (Oxford University Press, 2010), German (Springer Verlag), French (PPUR), Italian (Springer Italia), Spanish (JotDown Books) and Korean (Humanist Books); finalist at the Premio letterario Galileo 2012 (Padua) and Premio Galileo 2013 (Florence).

Selection of some public presentations.

- ChiaramenteScienza Venezia, LHC: fasi e obiettivi della sperimentazione, 4 March 2010.
- Festival della Scienza di Genova, 4 November 2010.
- FestivalScienza di Cagliari, 11 November 2010.
- Festival delle Scienze di Roma, 22 January 2011.
- ChiaramenteScienza Venezia, L'antimateria, 9 March 2011.
- InfinitaMente, Festival di Scienza, Cultura e Arte, Verona, 20 March 2011.
- Edinburgh International Science Festival, 10 April 2011.
- Háskóli Íslands, Reykjavík, 12 August 2011.
- Cinema & Scienze, Venezia, 28 October 2011.
- ChiaramenteScienza Venezia, La strana storia del neutrino, 22 November 2011.
- InfinitaMente, Festival di Scienza, Cultura e Arte, Verona, 18 March 2012.
- Isaac Asimov Memorial Debate, American Museum of Natural History, New York, 20 March 2012.
- Festival della Letteratura di Mantova, 8 September 2012.
- MeetMeTonight, Planetario di Milano, 28 September 2012.
- FestivalScienza di Cagliari, 7 November 2012.
- La Limonaia, Pisa, 20 November 2012.
- InfinitaMente, Festival di Scienza, Cultura e Arte, Verona, 11 March 2013.
- TEDxCERN, 3 May 2013.
- Pianeta Galileo, Firenze, 6 May 2013.
- Origins2013, CERN, Ginevra, 27 September 2013.
- La Fiera delle Parole, Padova, 13 October 2013.
- CognitivoPolis, Um festival de arte e tecnologia, Madeira, 17 November 2013.
- InfinitaMente, Festival di Scienza, Cultura e Arte, Verona, 16 March 2014.
- Pauli Lectures, Zurich, 5 May 2014.
- Drukpa Kagyu Buddhist Science Festival, Leh, India, 25 August 2014.
- Connecting Worlds: Science Meets Buddhism, Great Minds, Great Matters, Geneva, 23 March 2015.
- Am Limit? Grenzen in den Wissenschaften heute, Collegium Generale Bern, 25 March 2015.
- Académie royale des Sciences, des Lettres et des Beaux-Arts de Belgique, Bruxelles, 28 March 2015.
- Public Lecture Hanyang University, Seoul, 31 March 2017.
- Premio Cosmos per la divulgazione scientifica, Reggio Calabria, 21 June 2018.
- Public Lecture at ICHEP2018, Seoul, 8 July 2018.
- Was ist Geist?, Schweizerische Philosophische Gesellschaft, Basel, 7 September 2018.
- Domosofia, Festival delle idee e dei saperi, Domodossola, 21 September 2018.

- Indian Institute of Technology, Kharagpur, 7 October 2018.
- BergamoScienza, Lo strano mondo dei buchi neri, 14 October 2018.
- Naturmuseum Südtirol, Museo Scienze Naturali Alto Adige, Bolzano, 16 October 2018.
- Royal Flemish Academy of Belgium for Science and the Arts (KVAB), 30 November 2018.
- Higgs Lectures, University of Edinburgh, 27 March 2019.