

Professor Belén Gavela Curriculum Vitae

EDUCATION

- 1981 PhD Physics, Universidad Autónoma de Madrid (UAM), Spain
1979 Doctorat 3^{eme} Cycle, Universite De Paris-Sud (Orsay), France
1976 Bachelor of Physics, Universidad Autónoma de Madrid (UAM), Spain

CURRENT POSITIONS

- 1996 – Full Professor in Theoretical Physics, UAM, Spain
2003 – Permanent (Founding) Member, Institute for Theoretical Physics (IFT) UAM-CSIC, Spain

PREVIOUS POSITIONS

- 2012 – 2013 Paid Scientific Associate, PH (TH) Division, CERN, Switzerland
1995 – 2001 Fixed-term staff member, TH Division, CERN, Switzerland
1987 – 1996 Assistant Professor (Profesor Titular, permanent position), UAM, Spain
1984 – 1996 Chargée de Recherches CNRS, LPT, Orsay, France (permanent; resigned in 1996).
1981 – 1984 Atachée de Recherches CNRS, LPT, Orsay, France
1984 – 1986 Postdoctoral Fellow, TH Division, CERN, Switzerland
1981 – 1983 Postdoctoral Fellow (shared): Dept. of Physics, Harvard Univ. and Brandeis Univ., USA
1980 – 1981 Research Fellow, L.A.P.P. (Annecy-Le-Vieux), France
1979 – 1980 Stagiaire de Recherche, Ecole Polytechnique/ France

FELLOWSHIPS, AWARDS AND INSTITUTIONAL RESPONSIBILITIES

- Director of the Department of Theoretical Physics UAM (~100 members) 2009 – 2012. Note that in spite of its name, the department includes: i) Theoretical Particle Physics (string theory and phenomenology, astroparticle physics, neutrino physics, lattice gauge theories and cosmology); ii) Experimental Particle Physics (ATLAS, CMS, Superkamiokande); iii) Astrophysics, theoretical and observational (e.g. Herschel, Hubble Space Telescope); iv) Nuclear Physics; v) Neuroscience.
- Global Coordinator of the EU funded ITN INVISIBLES (www.invisibles.eu) 2012-2016. Total funding 3.823.903 euros.
- Global Coordinator of the H2020 ITN ELUSIVES (www.elusives.eu) 2016-2020. Total Funding 3,855,581,28 euros.
- Global Coordinator of the H2020 RISE INVISIBLESPPLUS (www.invisiblesplus.eu), 2016-2020. Total funding 2,070,000.
- PI of Italy-Spain grants 2004-2008 (INFN04-03, 05-06, 06-33, 07-27, 08-15), and of the the Japan-Spain 207-2007 project (JSPS-CSIC 07037211-000061, 100000 euros and 2006JP0017, 968112 euros).
- Local PI of PAU (Physics of the Accelerated Universe) Consolider-Ingenio 2010 and of BENE (Beams for European Neutrino Experiment) EU – Contract number RII3-7-2003-506395.
- PI of AEN97-1678, 1997-2000; 280.338 euros, which was the global UAM departmental grant for theoretical physics.

SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL RESEARCHERS

- Since 1991, Prof. Gavela tutored to completion 18 PhD Students (44% female): **A. Abada** (co-tutored, 1991, she is at present full professor at Univ. of Paris-Sud), **M. Traseira** (1991; he became later executive director of J.P. Morgan), **F.J. Vegas** (1992; he was next hired as a postdoc at Univ. of California San Diego), **P. Hernández** (1993, she was next hired by Harvard Univ. as Junior Fellow and she is now full professor at IFIC-Univ. of Valencia), **C. Quimbay** (1995; he returned to

his country and is at present full professor at Univ. Nacional de Colombia), **S. Vargas** (1997; she worked since then on medical science mainly at public hospitals in UK), **O. Mena** (2003; she was next hired as a postdoctoral fellow by Fermilab, and she is now a permanent CSIC researcher at IFIC and Univ. of Valencia), **A. Broncano** (2005; she was next hired as postdoc by Max Planck Institute, Munich, and is at present a high executive at Orange), **M. Salvatori** (2007; he was next hired as postdoc by TUM, Munich, and works at present in the nuclear safety industry), **E. Fernandez-Martinez** (2007; he was next hired as postdoc by Max Planck Institute, Munich, and is now permanent associate professor at UAM), **J. Lopez-Pavon** (co-tutored, 2009; he was next hired as a postdoctoral fellow by IPPP, UK, and he obtained in 2019 a tenure-track position at IFIC/Univ. of Valencia), **F. Bonnet** (2009; he was next hired as a postdoctoral fellow by the Univ. of Padova), **D. Hernández** (2010; he was next hired as postdoctoral fellow by ICTP, Trieste, and works now in Neuroscience at Columbia Univ. at New York), **R. Alonso** (2013; he was next hired by the Univ. of California at San Diego, and then by CERN and by IPMU in Tokyo), **J.A. Yepes** (2014; he was next hired by IHEP, Beijing), **I. Brivio** (2016; she was next hired as postdoctoral fellow by Niels Bohr Inst. in Copenhagen, and she has been hired in 2019 by the Univ. of Heidelberg as a five-year researcher), **S. Saa** (2017; she works on the private informatic sector), **R. Del Rey** (2018; she is pursuing a career in innovative teaching). Ongoing: **P. Quilez** (completion in 2019; he has been hired by DESY with start date October 2019).

Several of these former PhD students are at present world leaders in research, such as Pilar Hernandez - leader in neutrino physics and lattice gauge theory, Olga Mena –cosmology, Asmaa Abada –leader in phenomenology and lepton flavor, and Enrique Fernandez-Martinez – neutrino phenomenology. Recent ones who also became already leading scientists at the international level include Rodrigo Alonso (now at IPMU Tokyo) and Ilaria Brivio (now in a five-year position at Heidelberg Univ., offered after only 1.5 years as fresh postdoc at NBI Copenhagen). Furthermore, D. Hernandez moved to Neuroscience at Columbia University at New York. A few others became very prominent in the private sector, e.g. M. Traseira (former executive director of JP Morgan London), A. Broncano (high-level executive at Orange) and M. Salvatori (Tecnatom, nuclear safety).

→ Prof. Gavela has also mentored postdoctoral researchers which later became drivers of research and moved to prestigious positions in academia, among which: Stefan Antusch (tenured, Basel Univ.), Stefano Rigolin (tenured, Padova Univ.), Andrea Donini (tenured at CSIC-IFIC), Emidio Gabrielli (tenured, Trieste U. and NICPB, Tallinn), Laura-Lopez-Honorez (tenured at Univ. Libre de Bruxelles), Luca Merlo (on tenure-track at IFT, Madrid), Carla Biggio (tenured at Genova, Italy), Pedro A. N. Machado (on tenure-track at Fermilab), Viviana Niro (postdoctoral researcher at Max Planck Inst. Heidelberg). Others among her postdoctoral fellows moved to brilliant careers in industry, e.g. Steve Blanchet.

Since many years, she also tutors about one UAM master student per year.

TEACHING ACTIVITIES

Since 1987, Assistant Professor and then and Full Professor, Department of Theoretical Physics, UAM, Spain. These include both undergraduate courses and master courses. She also teaches regularly in prominent international schools, e.g. the CERN European School and others.

RECENT REPRESENTATIVE PUBLICATIONS (a selection among those with few authors)

Prof. Gavela has written a total of 119 scientific articles which have received 10113 INSPIRE citations. These publications appeared in the leading top-cited refereed journals of her research area. For the overwhelming majority of them, she is the main author and the initiator of the research project. Recent publications include:

1. R. Alonso, M.B. Gavela, L. Merlo, S. Rigolin and J. Yepes. “The Effective Chiral Lagrangian for a Dynamical Higgs Particle”, *Phys.Lett. B*722 (2013) 330. [arXiv:1212.3305].
2. I. Brivio, T. Corbett, O.J.P. Eboli, M.B. Gavela, J. Gonzalez-Fraile, M.B. Gavela, L. Merlo and S. Rigolin, “Disentangling a dynamical Higgs”, *JHEP* 1403 (2014) 024, [arXiv:1311.1823].

3. M.B. Gavela, E.E. Jenkins, A. Manohar and L. Merlo. "Analysis of Effective Power Counting Rules in Effective Field Theory". Eur. Phys. J. C76 (2016) no.9, 485. [arXiv:1601.07551].
4. F. Feruglio, M.B. Gavela, K. Kanshin, P.A.N. Machado, S. Rigolin and S. Saa. "The minimal linear sigma model for the Goldstone Higgs", JHEP 1606 (2016) 038, [arXiv:1603.05668].
5. R. Alonso, M.B. Gavela, L. Maiani and G. Isidori. "Neutrino Mixing and Masses from a Minimal Principle", JHEP 1311 (2013) 187. [arXiv:1306.5927].
6. R. Alonso, E. Fernandez-Martinez, M.B. Gavela, B. Grinstein, L. Merlo and P. Quilez. "Gauged Lepton Flavour", JHEP 1612 (2016) 119, [arXiv:1609.05902].
7. A. Abada et al., Low Energy effects of neutrino mass, JHEP 0712 (2007) 061. [arXiv:0707.4508].
8. M.B. Gavela et al., Minimal Flavour Seesaw models, JHEP 0909 (2009) 038. [arXiv:0906.1461].
9. I. Brivio, M.B. Gavela, L. Merlo, K. Mimasu, J.M. No, R. del Rey and V. Sanz. "ALPs Effective Field Theory and Collider Signatures", [arXiv:1701.05379]. Eur.Phys.J. C77(2017) no. 8, 572.
10. M.K. Gaillard, M.B. Gavela, R. Houtz, P. Quilez and R. del Rey. "Color Unified Dynamical Axion", [arXiv:1805.06465]. Eur.Phys.J. C78(2018) no. 11, 972.
11. G. Alonso-Alvarez, M., "Axion couplings to electroweak gauge bosons"[arXiv:1811.05466], Eur.Phys.J. C79 (2019) no.3, 223
12. M.B. Gavela, M. Ibe, P. Quilez and T.T. Yanagida, "Automatic Peccei-Quinn symmetry"[arXiv:1812.08174]. Eur.Phys.J. C79 (2019) no.6, 542.
13. M.B. Gavela, R. Houtz, P. Quilez, R. Del Rey and O. Sumensari, " Flavour-changing constraints on electroweak ALP couplings", Eur.Phys. J. C79 (2019) no.5, 369 [arXiv:1901.02031].
14. Non-resonant Searches for Axion-like Particles at the LHC. M.B. Gavela, J.M. No, V. Sanz and J.F. de Troconiz, arXiv1905.12953.

INVITED PRESENTATIONS TO INTERNATIONAL CONFERENCES AND EVENTS (only recent ones listed)

1. Plenary invited talk at the COST workshop "Higgs and Flavour Physics: present and future", IST-Lisbon 14-17 January 2019.
 2. Plenary invited talk at the workshop "The future of Particle Physics: A Quest for Guiding Principles", KIT, Karlsruhe, October 1-2 2018.
 3. Plenary invited talk at the PASCOS 2019 conference, Cleveland, 4-8 June 2018.
 4. Plenary invited review-talk at Moriond Electroweak, La Thuile March 18-25 2017.
 5. Plenary invited talk at ALPS2017, Obergurgl April 17-22 2017.
 6. Plenary invited talk at Planck 2017, Warsaw May 22-27 2017.
 7. Plenary invited talk at the 18th Lomonosov Conf. on Elementary Part. Phys., Moscow, Aug. 24-30, 2017
 8. Plenary invited talk at DavCo conference, CP³-Origins, Odense August 28-Sept. 1 2017.
- Furthermore, several of the presentations in the last decade are summaries/major reviews/introductions, e.g.
- * Theoretical summary (overview) of the world Neutrino 2016 Conference (XXVII International Conference on Neutrino Physics and Astrophysics), London July 9-16, UK. This is *the* major world conference in that field, bianual, which gathered 600 scientists in 2016.
 - * Theory summary of Moriond Electroweak 2010, La Thuile , Italy.
 - * Plenary review talk at the APS (American Physical Society, general meeting) 2008, Denver, USA.

ORGANISATION OF INTERNATIONAL CONFERENCES

World Biannual Conference on Neutrino Physics 08 (Christchurch, New Zealand), GGI Workshop "What is nu?" 2012 (Florence) , Invisibles-12 (Florence), -13 (Durham), -14 (Paris), -15 (chair, Madrid), -16 (Padova), -17 (Zurich) and -18 (Karlsruhe). HEFT (Higgs Effective Field Theory) 2014 (Madrid), HEFT 2015 (Chicago), Corfu 2016, 2017. 130-350 participants each. Ongoing: BLV2019 (chair, Madrid) and Invisibles 2019 (IFUC, Valencia).

COMMISSIONS OF TRUST AND RESPONSIBILITIES (selected)

It is to be noted that the international committee memberships have *always* been as invited independent advising scientist, that is, not for institutional/political reasons.

- * Prof. Gavela is the first female scientist ever to have been offered and to hold a staff position at CERN TH Division, and also the first female that became Full Professor in Theoretical Physics in her country.
- * Since 2014, *member of CERN Scientific Policy Committee (SPC)* (CERN top scientific advisory body).
- * Member of the “Search Committee for the new CERN Director General” in 2015, as one of four elected by CERN SPC. (F. Gianotti was elected DG).
- * **CERN-SPC (only theorist) present elected representative for European Strategy for Particle Physics Upgrade 2018-2020.**
- * Member of the H2020 Panel of Consolidator ERC in 2016 and 2018.
- * Panel Vicechair of H2020 Marie Curie ITN projects of the European Council/EU, 2017 and 2018.
- * 2009 – 2012: Director of the Department of Theoretical Physics UAM/Spain (~100 scientists).
- * 2012 – ongoing. Member of the French P2I0 Scientific Council.
- * 2012 – 2016 Global coordinator of the FP7 MSCA ITN (Initial Training Network) “INVISIBLES”.
- * 2016 – ongoing. *Global coordinator of the H2020 MSCA ITN (Innovative Training Network) “ELUSIVES”.*
- * 2016 – ongoing. *Global coordinator of the H2020 MSCA RISE “INVISIBLESPLUS”.*
- * 2016 – 2018 Member of the Advisory Committee of ANVUR (Italian National Agency of the University System Evaluation and Research), resigned.
- * Editor of JHEP. Referee of Phys. Lett. B, Nucl. Phys. B, Phys. Rev. D, Phys., Phys. Rev. Lett. and JCAP.
- * Regularly called to the hiring selection committees or evaluation panels of national grants : Belgium (FRS-FNRS), Switzerland (Swiss National Science Foundation), UK (Univ. of Durham), France (French National Research Agency and LPC Clermont), Italy (INFN), Israel (US-Israel Binational Science Foundation), Spain (ANEP, plus CSIC and University committees, ICREA, IKERBASQUE), Sweden (Univ. of Stockholm).
- * Prof. Gavela is a scientist of reference solicited to serve in committees or assess the progress of women scientists, for initial hirings, tenure granting or advance career progress. E.g. in the last 4 years, she served for this purpose at Niels Bohr Institute (Copenhagen), LPC (Univ. de Clermont, France), San Diego Univ. (USA), IPPP-Durham Univ. (UK), Valencia Univ. (Spain) and ICREA (Spain).