



Ezequiel Alvarez

PhD in Theoretical Physics

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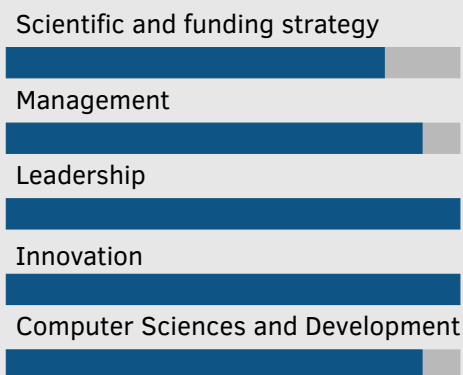
About me

I am passionate about understanding new theories and tools, and using them to find out how the Universe behaves and in applications that are useful for Society. I enjoy doing research in Machine Learning and in phenomenology in High Energy Physics to further understand Nature. I also love teaching and advising Master and PhD students.

I am the ICAS Director, where I pour important effort to maintain a high standard research and innovation Institute. With the help of all my colleagues, we are building the high quality research Institute we dreamt up.

If I had to summarize my work, my passion, my wishes, my past, my present and my future in one word, that would be: *Motivation*.

Skills



Interests

Research & Development: I based my progress and headway on a triple-engine consisting in basic research, apps development, and teaching. Since a few years ago all three are crossed by Machine Learning and each one helps grow the others. In basic research I am mainly involved in LHC High Energy Physics; in apps development I am engaged in doing Machine Learning tools to analyze big data in health, apps in Natural Language Processing for different communities, and general apps for the benefit of society; and in the academy I am highly committed in teaching Machine Learning and in organizing the Data-Science career at my University (UNSAM). I am also very interested in recent progress in all other fields of Science and I do my best to keep track of relevant news and findings in this direction.

Science Policy: I pursue science to best serve public interests. I am involved and very interested in promoting women in science; and as a fact 60% of the researchers I have formed as doctors are women. I am interested in enhancing knowledge, skills and intelligence in the Developing World as an added value for improving the quality of life as a whole.

Positions & Education

Since 2021	ICAS Director (Argentina) icas.unsam.edu.ar	(International Center for Advanced Studies)
Since 2006	Research Permanent Position Independent Researcher	CONICET (Argentina)
Since 2016	Professor Physics	University of San Martin (Argentina)
2017-2020	Latin American Representative (unique) International Committee for Future Accelerators	ICFA (International)
2012	Postdoc Stanford University	SLAC (USA)
2011-2017	Regular Associate International Centre for Theoretical Physics	ICTP (Italy)
2011-2012	Professor Physics	University of San Luis (Argentina)
2006-2014	Assistant professor Physics	University of Buenos Aires UBA (Argentina)
2006-2009	Physics Olympiad Coordinator Province management and development for the Physics Olympiad	San Luis (Argentina)
2001-2005	PhD in Theoretical Physics Thesis: <i>CP, T and CPT analyses in EPR-correlated $B^0 \bar{B}^0$ decays</i>	Valencia University (Spain)
1997-2000	Master in Theoretical Physics Prize <i>First of the Class</i>	Institute Balseiro, Bariloche (Argentina)

Research and Development (R+D)

2022	UNSAM Intelligent Dropout Program, AI development to estimate University dropout probabilities for students and the corresponding policies to avoid it
2020-	Intelligent Parliament, app for Argentina's National Congress to track speeches and topics in the Congress using Topics Model
2020-2022	Early Intelligent Alarm for COVID-19 working at Buenos Aires Health Ministry
2020-2021	Citizen Mobility Index, for National Government in collaboration with Telefónica and Movistar
2020-	IArxiv.org development, an AI tool for sorting papers according to each user preferences, used by the scientific community across the globe
2014-	Qlink.it development, an app for secure messaging across IT devices and platforms
More:	icas.unsam.edu.ar/ai

Summary of Scientific Work

- 2000-2022 42 international scientific publication in journals as JHEP, Physical Review, Nuclear Physics, Physics Letters, etc.
2001-2022 ~ 30 international conferences, schools, workshops, etc.
2008-2022 Full formation to PhD level of Dr. Estefanía Coluccio Leskow, Dr. Juan Ignacio Sanchez Vietto, Dr. Mariel Estévez, Dr. Rosa Sandá Seoane, and Dr. Manuel Szewc. Currently advising 2 more PhD students. 9 Master Thesis advised.

Languages

English	Excellent
Spanish	Native
Italian	Excellent
French	Very good

Scientific articles

- 45) 2024 E. Alvarez, Y. Yao “Inferring flavor mixtures in multijet events”
e-Print: 2404.01387 [hep-ph]
- 44) 2024 E. Alvarez, M. Szewc, L. Da Rold, A. Szynekman, A. Tanco, T. Tarutina, “Improvement and generalization of ABCD method with Bayesian inference”
e-Print: 2402.08001 [hep-ph]
- 43) 2023 E. Alvarez, M. Szewc, A. Szynekman, A. Tanco, T. Tarutina, “Exploring unsupervised top tagging using Bayesian inference”
SciPost Phys.Core 6 (2023) 046 • e-Print: 2212.13583 [hep-ph]
- 42) 2022 E. Alvarez, “Bayesian inference to study a signal with two or more decaying particles in a non-resonant background”
e-Print: 2210.07358 [hep-ph]
- 41) 2022 E. Alvarez, Michael Spannowsky and Manuel Szewc, “Unsupervised Quark/Gluon Jet Tagging With Poissonian Mixture Models”
Front.Artif.Intell. 5 (2022) 852970 • e-Print: 2112.11352 [hep-ph]
- 40) 2022 E. Alvarez, Barry Dillon, Darius Faroughy, Jernej Kamenik, Federico Lamagna and Manuel Szewc, “Bayesian probabilistic modeling for four-top production at the LHC”
Phys.Rev.D 105 (2022) 9, 092001 • e-Print: 2107.00668 [hep-ph]
- 39) 2021 E. Alvarez, Aurelio Juste, Manuel Szewc and Tamara Vasquez Schroeder, “Topping-up multilepton plus b-jets anomalies at the LHC with a Z' boson”
JHEP 05 (2021) 125. e-Print: 2011.06514 [hep-ph]
- 38) 2021 E. Alvarez, Mariel Estévez and Rosa Sanda Seoane, “ Z' -explorer: A simple tool to probe Z' models against LHC data”
Comput.Phys.Commun. 269 (2021) 108144 • e-Print: 2005.05194 [hep-ph]
- 37) 2020 E. Alvarez, Federico Lamagna and Manuel Szewc, “Topic Model for four-top at the LHC”
JHEP 01 (2020) 049 • e-Print: 1911.09699 [hep-ph]
- 36) 2019 E. Alvarez, Aurelio Juste and Rosa Sanda Seoane, “Four-top as probe of light top-philic New Physics”
JHEP 12 (2019) 080 • e-Print: 1910.09581 [hep-ph]
- 35) 2019 E. Alvarez and M. Szewc, “Non-resonant Leptoquark with multigeneration couplings to $\mu\mu jj$ and $\mu\nu jj$ at LHC,”
JHEP 12 (2019) 080 • e-Print: 1910.09581 [hep-ph]
- 34) 2018 E. Alvarez, L. Da Rold, A. Juste, M. Szewc and T. Vazquez Schroeder, “A composite pNGB leptoquark at the LHC,”
arXiv:1808.02063 [hep-ph], JHEP 1812 (2018) 027

Scientific articles

- 33) 2018 E. Alvarez, L. Da Rold, M. Estevez and J. F. Kamenik, "Measuring $|V_{td}|$ at the LHC,"
Phys. Rev. D 97 (2018) no.3, 033002
- 32) 2018 E. Alvarez, "Exercise: Dark Matter as fields that evolve backward in time,"
arXiv:1803.08531 [gr-qc], presented in workshop *Voyages Beyond the SM II, 2018*, French Polynesia, Feb23 – Mar2, 2018
- 31) 2017 E. Alvarez and M. Estevez, "ttbb as a probe of New Physics at the LHC"
Phys.Rev. D96 (2017) no.3, 035016
- 30) 2017 E. Alvarez, D. Faroughy, J. Kamenik, R. Morales, A. Szynekman "Four tops for the LHC"
Nucl.Phys. B915 (2017) 19-43
- 29) 2017 E. Alvarez, L. Da Rold, J. Mazzitelli and A. Szynekman, "Graviton resonance phenomenology and a pNGB Higgs at the LHC,"
Phys.Rev. D95 (2017) no.11, 115012
- 28) 2017 E. Alvarez, L. Da Rold, J. Mazzitelli and A. Szynekman, "Graviton resonance phenomenology and a pseudo-Nambu-Goldstone boson Higgs at the LHC,"
Phys. Rev. D 95 (2017) no.11, 115012
- 27) 2017 E. Alvarez, L. Da Rold, J. Mazzitelli and A. Szynekman, "A 750 GeV graviton and the Higgs as a pNGB,"
arXiv:1606.05326 [hep-ph]
- 26) 2016 E. Álvarez, A. Cuoco, N. Mirabal and G. Zaharijas, "Search for a correlation between UHECR events and high-energy gamma-ray Fermi-LAT data"
JCAP 1612 (2016) 023
- 25) 2016 J.F. Zanella, E. Álvarez, W. Dragani and A. Pescio, "An estimation of the effect of a possible wind speed increase on the ocean mixed layer depth at the northern Patagonian continental shelf"
Regional Studies in Marine Sciences, 6, 7/2016, pp. 87–95.
- 24) 2014 J. A. Aguilar-Saavedra, E. Álvarez, A. Juste and F. Rubbo, "Shedding light on the $t\bar{t}$ asymmetry: the photon handle,"
JHEP 1404 (2014) 188
- 23) 2014 E. Álvarez, L. Da Rold and J. I. Sanchez Vietto, "Single production of an exotic bottom partner at LHC,"
JHEP 1402 (2014) 010
- 22) 2014 E. Alvarez, E. C. Leskow, J. Drobnak and J. F. Kamenik, "Leptonic Monotops at LHC,"
Phys. Rev. D 89, 014016 (2014)
- 21) 2013 E. Alvarez, J. I. S. Vietto and A. Szynekman, "Top-antitop resonance searches beyond 1 TeV,"
Phys. Rev. D 87, no. 5, 054015 (2013)
- 20) 2012 E. Alvarez and E. C. Leskow, "A charged Z' to conciliate the apparent disagreement between top-antitop Tevatron forward-backward asymmetry and LHC charge asymmetry,"
Phys. Rev. D 86, 114034 (2012)
- 19) 2012 E. Alvarez and Y. Bai, "Reach the Bottom Line of the Sbottom Search,"
JHEP 1208, 003 (2012)

Scientific articles

- 18) 2012 E. Alvarez, "Improving top quark induced charge asymmetries at the LHC using $t\bar{t}$ transverse momentum,"
Phys. Rev. D 85 (2012) 094026
- 17) 2011 E. Alvarez, L. Da Rold, J.I.S. Vietto, A. Szykman, "Phenomenology of a light gluon resonance in top-physics at Tevatron and LHC,"
JHEP 1109 (2011) 007
- 16) 2011 E. Alvarez, E. C. Leskow, J. Zurita, "Collider Bounds on Lee-Wick Higgs Bosons,"
Phys. Rev. D 83 (2011) 115024
- 15) 2011 E. Alvarez, L. Da Rold, A. Szykman, "A composite Higgs model analysis of forward-backward asymmetries in the production of tops at Tevatron and bottoms at LEP and SLC,"
JHEP 1105 (2011) 070
- 14) 2010 E. Alvarez, Francisco D. Mazzitelli, Alejandro G. Monastera and Diego A. Wisniacki "Casimir force between integrable and chaotic pistons"
Phys. Rev. A 82 (2010) 052504
- 13) 2009 E. Alvarez, L. Da Rold, C. Schat, A. Szykman, "Vertex Displacements for Acausal Particles: Testing the Lee-Wick Standard Model at the LHC,"
JHEP 0910 (2009) 023
- 12) 2009 E. Alvarez, L. Da Rold, C. Schat, A. Szykman, "Wrong vertex displacements due to Lee-Wick resonances at LHC,"
PoS EPS-HEP2009 (2009) 267
- 11) 2009 E. Alvarez, F. D. Mazzitelli, "Long range Casimir force induced by transverse electromagnetic modes,"
Phys. Rev. D 79 (2009) 045019
- 10) 2008 E. Alvarez, L. Da Rold, C. Schat, A. Szykman, "Electroweak precision constraints on the Lee-Wick Standard Model,"
JHEP 0804 (2008) 026
- 9) 2008 E. Alvarez, A. Szykman, "Direct test of time reversal invariance violation in B mesons,"
Mod. Phys. Lett. A 23 (2008) 2085-2091
- 8) 2008 E. Alvarez and Francisco D. Mazzitelli "Decoherence induced by Smith-Purcell radiation,"
Phys. Rev. A 77 (2008) 032113
- 7) 2006 E. Alvarez, J. Bernabeu, M. Nebot, "The Demise of flavor tagging and its Delta-T dependence,"
PoS HEP2005 (2006) 252
- 6) 2006 E. Alvarez, J. Bernabeu, M. Nebot, "Delta t-dependent equal-sign dilepton asymmetry and CPTV effects in the symmetry of the B^0 -anti- B^0 entangled state,"
JHEP 0611 (2006) 087

Scientific articles

- 5) 2005 A. Satz, F. D. Mazzitelli, E. Alvarez, "Vacuum polarization around stars: Nonlocal approximation,"
Phys. Rev. D71 (2005) 064001
- 4) 2005 . Alvarez, J. Bernabeu, N. E. Mavromatos, M. Nebot, J. Papavassiliou, "CPT violation in entangled $B^0 - \bar{B}^0$ states and the demise of flavor tagging,"
Phys. Lett. B607, 197-203 (2005)
- 3) 2004 E. Alvarez, L. N. Epele, D. G. Dumm, A. Szykman, "Right handed currents and FSI phases in $B^0 \rightarrow \phi K^{*0}$,"
Phys. Rev. D70 (2004) 115014
- 2) 2004 E. Alvarez, J. Bernabeu, "Correlated neutral B meson decays into CP eigenstates,"
Phys. Lett. B579, 79-85 (2004)
- 1) 2001 E. Alvarez, F. D. Mazzitelli, "Covariant perturbation theory and the Randall-Sundrum picture,"
Phys. Lett. B505 (2001) 236-242