David **Sierra Porta**, PhD.

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Actual Position: Full Time Associate Professor (Physics and Data Science), Facultad de Ciencias Básicas, Universidad Tecnológica de Bolivar, UTB (utb.edu.co)
Residency: Cartagena de Indias, Colombia.

Relevant Expertise

*Throughout my career, I have developed solid and diverse experience in both **theoretical and experimental physics**, **advanced mathematics**, as well as in advanced data analysis and data science. My background in physics and mathematics has allowed me to tackle complex problems with a rigorous approach, applying nonlinear dynamic models and advanced resolution techniques to describe and solve physical and natural phenomena. This combination of theoretical and experimental expertise has provided me with a deep understanding of astroparticle fluxes, cosmic rays, and their interactions, as well as the characterization of these processes using specialized detectors. In addition to my experience in physics, I possess strong skills in **data science and advanced computational techniques**. I have applied **machine learning, deep learning, data mining, and artificial intelligence** methods to solve problems in multidisciplinary fields, developing predictive and descriptive models that address both scientific problems and challenges in industry and the financial sector. My ability to collect, organize, and analyze **large volumes of data** has enabled me not only to extract valuable insights but also to communicate these findings clearly and comprehensively, presenting the results in high-impact scientific journals and at international conferences. As a university professor with more than 15 years of experience, I have taught courses in areas as diverse as Quantum Mechanics, Statistical Physics, Statistics and Probability, Numerical Methods, and Data Science. My pedagogical approach focuses on guiding students through solving complex problems using mathematical and computational tools, providing them with a solid understanding that allows them to apply this knowledge across various disciplines. My active participation in the **management and execution of research projects** for both companies and universities has demonstrated my ability not only to lead teams but also to ensure that projects are successfully completed, delivering innovative and high-quality results. My competencies in preparing detailed reports and analyses have been key to effectively communicating progress and discoveries in every project I have been involved in.*

Studies Completed - Academic Training

2016: **Ph.D. in Fundamental Physics**.
Universidad de los Andes (ULA). Facultad de Ciencias. Mérida, Venezuela.
- *Modified gravity studies and theories of gravity based on scalar, vector and tensor fields of higher order for the construction of alternative theories of gravity.*
- *Quantum Field Theory - Gravitation and General Relativity.*
- *Canonical analysis and duality analysis in field theories.*

2004: **Magister Scientiae (M.Sc.) in Fundamental Physics**.
Universidad de los Andes (ULA). Facultad de Ciencias. Mérida, Venezuela.
- *Study of Chern-Simons super-gravity models.*
- *Multi-dimensional super-gravity and quantum field theory.*
- *Dimensional reduction in high-dimensional theories.*

2001: **Mathematics and Physics Degree**.
Universidad del Zulia (LUZ). Maracaibo, Venezuela.
- *Research assistant in mathematics and physics education projects in middle, high school and university education.*
- Assistant of the Laboratory for Physics Teaching of the Faculty of Humanities and Education.
- *Student Trainer and Teaching Assistant in the Department of Mathematics and Physics.*

1995: **Bachelor in Science**. Secondary and Bachelor of Science.
Colegio Marista San Pablo. Machiques, Venezuela.

Networks and Partnerships

- Member of American Physical Society (APS), No 62147697.
- Member of American Statistical Asociation (ASA), No 29579.
- Member of the INTER-AMERICAN STATISTICAL INSTITUTE (IASI).
- Member of the Colombian Statistical Society (SCE).

Expertise - Work

2022-Today: **Full Time Associate Professor - Full Time**.

- Universidad Tecnológica de Bolivar. Faculty of Basic Sciences. (https://www.utb.edu.co/).
- Researcher and Professor of the Master courses of Mechanics, Electromagnetism, Thermodynamics and Waves.
- Researcher and Professor of Postgraduate Master Courses in Statistics and Data Science, Data Mining, Machine Learning, Time Series.

2021-2022: **Senior Data Scientist**.

- Company: DBAccess (https://dbaccess.com/).
- Business Analitics. Data analytics projects for international insurance, contractors, investment, etc. companies. Decision management, modeling, forecasting, visualization for business.
- Information data collection, analyze and accurately interpret the information obtained, prepare reports and reports that allow the visualization of the data in an understandable way to a general public and other information products resulting from data analysis.

2021-2021: **Senior Data Analytics Expert**.

- Company: IMMAP-Colombia (https://immap.org/colombia/).
- Name of associated project: Migration of children and adolescents in Latin America, financed by UNICEF.
- To monitor the humanitarian situation of children, adolescents and their families in migration situations in Latin America and the Caribbean with a special focus on the conditions of mobility and access to basic services such as medical care, food and livelihoods, protection, education, shelter, water and sanitation, in order to inform programmatic decisions by UNICEF and its partners.
- Collect data information, analyze and accurately interpret the information obtained, prepare reports and briefs that allow the visualization of the data in a way that is understandable to a general audience and other information products resulting from the analysis of the data.

2021-2021: **Professor-Chair**.

- Science Faculty. Universidad Industrial de Santander. Physics Departament. Bucaramanga, Santander - Colombia. (https://www.uis.edu.co/).
- Professor of Mathematical Modeling II (Graduate, Master's Degree in Applied Mathematics) and Computational Tools (Undergraduate).

2020-2022: **Fellow Research Postdoctoral Position**.

- Associate Project name: Dark Energy Spectroscopic Instrument (DESI).
- Physics Departament. Universidad de los Andes, Colombia.
- Study and analysis of DESI project data https://www.desi.lbl.gov/. Active in working BGS (Bright Galaxy Survey) groups for data analysis.

2020-2022: **Master Professor**.

- Science Faculty. Universidad de los Andes. Physics Departament. Bogotá, Colombia.
- Professor of the Master courses of Electromagnetism and Thermodynamics.

2019-2020: **Professor-Chair**

- Science Faculty. Universidad Industrial de Santander. Physics Departament. Bucaramanga, Santander - Colombia.
- Professor of Electromagnetism and Physics courses.

2018-2019: **Academic Staff - Research Associate**.

- Associate Project name: Research Associate on Muon Tomography.
- Department of Physics and Astronomy. University of Sheffield. Sheffield, United Kingdom.
- Study and analysis of astroparticle fluxes in volcanic structures for the application of the technique of Volcanic Muongraphy (Muon Tomography applied to Colombian volcanoes).
- Theoretical and experimental studies in the field of astroparticles and characterization of cosmic ray detectors.

2017-2018: **Post-Doctoral Position**.

- Associate Project name: Muon Telescope (MuTe-UIS) for muongraphy of Colombian volcanoes.
- Relativity and Gravitation Research Group (GIRG) and Halley Group of Astronomy and Aerospace Sciences. Industrial University of Santander. School of Physics. Bucaramanga, Colombia.
- Study and analysis of astroparticle fluxes in volcanic structures for the application of the Volcanic Muongraphy technique (Muon tomography applied to Colombian volcanoes).
- Theoretical and experimental studies in the field of astroparticles and characterization of cosmic ray detectors.

2016-2017: **Post-Doctoral Position**.

- Associate Project name: Simulation of scintillators and Cherenkov detectors for the muon telescope for volcanic muongraphy, MuTe-UIS.
- Relativity and Gravitation Research Group (GIRG) and Halley Group of Astronomy and Aerospace Sciences. Industrial University of Santander. School of Physics. Bucaramanga, Colombia.

- Study and analysis of astroparticle fluxes in volcanic structures for the application of the Volcanic Muongraphy technique (Muon tomography applied to Colombian volcanoes).
- Theoretical and experimental studies in the field of astroparticles and characterization of cosmic ray detectors.

2016-2017: **Director of the Center for Scientific Modeling, CMC**.
- Experimental Science Faculty. Universidad del Zulia. Maracaibo, Venezuela.

2008-2018: **Ordinary Active Researcher of the Center for Scientific Modeling, CMC.**
- Experimental Science Faculty. Universidad del Zulia. Maracaibo, Venezuela.
- Research in the area of Theoretical Physics and Relativity and Gravitation. Also researcher in the experiments for the study and characterization of the Relampago del Catatumbo, electroatmospheric discharges in the Eastern Coast of Maracaibo Lake, Venezuela.

2004-2015: **Ordinary Active Researcher of the Laboratory of Astronomy and Theoretical Physics, LAFT**.
- Experimental Science Faculty. Universidad del Zulia. Maracaibo, Venezuela.

2008-2018: **Full Time Professor-Researcher with Exclusive Dedication**.
- Experimental Science Faculty. Universidad del Zulia. Departamento de Física. Maracaibo, Venezuela.
- A variety of courses have been taught: Classical Mechanics, Quantum Mechanics, Electromagnetism, General Physics 1, General Physics 2, Modern Physics, Statistics and Probability, Numerical Methods, Mathematical Methods I, Mathematical Methods II, Introduction to the Physics Laboratory, Experimental Techniques for Physicists.

2004-2008: **Regular Assistant Professor-Researcher with Part-time Dedication**.
- Mathematics and Physics Departament. Hummanities and Education Faculty. Universidad del Zulia.
- A variety of courses have been taught including General Physics 1-5, Geometry, Linear Algebra, Calculus 1-3, Thermodynamics and Introduction to Physics Laboratory.

2004-2006: **Associate Professor Full Time**.
- Industrial Engineer School. Universidad Rafael Urdaneta (URU). Maracaibo, Venezuela.
- A variety of courses have been taught including General Physics 1, Wave Mechanics, Thermodynamics, Statistics and Probability, and Introduction to the Physics Laboratory.

2005-2008: **Head of the Physics Teaching Laboratory**.
- Mathematics and Physics Departament. Hummanities and Education Faculty. Universidad del Zulia.
- Management for the direction of the teaching laboratories of the School of Humanities and Education of the Universidad del Zulia.

Distinctions, recognitions and additional

- **Director of Master Program: Applied Statistic and Data Science**.
  Universidad Tecnológica de Bolivar. Basic Science Faculty. Cartagena de Indias, Colombia.
- **Co-creator of Undergraduate Program in Data Science**.
  Universidad Tecnológica de Bolivar. Basic Science Faculty. Cartagena de Indias, Colombia.
- Director of the Semillero de Astronomía y Ciencia de Datos of the Universidad Tecnológica de Bolivar. Faculty of Basic Sciences. Cartagena de Indias, Colombia.
- Director/Leader of the Research Group in Gravitation and Applied Mathematics of the Universidad Tecnológica de Bolivar. Faculty of Basic Sciences. Cartagena de Indias, Colombia.
- Lecture Courses in International Workshop in Applied Statistic and data Science en Cartagena de Indias, Colombia, based on Data Mining and una Introduction to Machine learning.
- Lecture Courses at El Encuentro matemático del Caribe in Cartagena de Indias, Colombia, about A gentle Introduction to Gradient Descent in Data Science.
- Organizer of the International Workshop in Applied Statistic and Data Science en Universidad Tecnológica de Bolivar, Basic Science Faculty, Cartagena de Indias, Colombia. The event is realized each year in June.

Research Projects

1. Observación solar, clima espacial y ciencia de datos. Medición de la rotación solar a partir de imágenes de cámaras digitales imágenes. David Sierra Porta (Principal Investigator), Yaleidys Paola Hernández Diaz (Co-Principal Investigator). UTB Research Division Internal Call for Proposals. **($35,900,000)**. Grant **INV03CI2205**. Start: may 17, 2022, Finish: january 17, 2023. **Financed**.
2. Cartografía de los estudios migratorios: Análisis de Fuentes Secundarias sobre la Migración en América Latina Y El Caribe a partir de metodologías de Ciencias de Datos. Andy Domínguez Monterrosa (Principal Investigator), David Sierra Porta (Co-Principal Investigator). UTB Research Division Internal Call for Proposals. **($35,900,000)**. Grant **INV03CI2205**. Start: may 17, 2022, Finish: january 17, 2023. **Financed**.
3. Observación solar, clima espacial y ciencia de datos. Estudio estadístico de los parámetros de actividad solar del ciclo solar 24. Jorge Villalba Acevedo (Principal Investigator), David Sierra Porta (Co-Principal Investigator). UTB Research Division Internal Call for Proposals. **($35,900,000)**. Grant **INV03CI2205**. Start: may 17, 2022, Finish: january 17, 2023. **Financed**.
4. Simetría de dualidad para teorías de espín 2 masivas. Principal Investigator. Financiado por la División de Investigación de la Facultad Experimental de Ciencias de la Universidad del Zulia, bajo el código FDI-12-2015.

5. Soluciones de la ecuación de Thomas-Fermi con aproximación de métodos de cálculo variacional. Investigador Principal. Financiado por la División de Investigación de la Facultad Experimental de Ciencias de la Universidad del Zulia, bajo el código RDI-351-2015.
6. Algunos aspectos sobre la dualidad gravitacional. Co-Principal Investigator. Funded by the Research Division of the Experimental Faculty of Sciences of the Universidad del Zulia, under the code RDI-352-2015.
7. Radiación de Cargas Aceleradas. Estudio de la Ecuación de Lorentz-Dirac. Co-Investigador. Funded by the Research Division of the Experimental Faculty of Sciences of the Universidad del Zulia, under the code FDI-25-20010.
8. Cosmología con Campos Escalares y Ecuación de Estado No-Local. Principal Investigator. Funded by the Research Division of the Experimental Faculty of Sciences of the Universidad del Zulia, under the code FDI-30-2009.
9. Estudio Canónico-Dinámico de la Gravedad cuatro (4) dimensional con simetría transversa de Fierz-Pauli. Principal Investigator and Responsible. Registered by the Council of Scientific and Humanistic Development, CONDES, under the code CC-0689-2008.
10. Cosmología con Ecuación de Estado No-Local. Principal Investigator and Responsible. Registered by the Council of Scientific and Humanistic Development, CONDES, under the code CC-0844-2008.
11. Formulación Variacional de Ecuaciones Diferenciales Parciales Estocásticas. Co-Principal Investigator and Responsible. Registered by the Council of Scientific and Humanistic Development, CONDES, under the code DI-FEC-702-2004.

Publications in peer-reviewed journals

Working:

1. Data Science: Modeling of social problems and analysis of international business in the area of finance, insurance, etc.
2. Space weather: Studying characteristics and behaviors of solar dynamics and their influence on cosmic ray counts detected at the earth's surface.
3. Muon tomography applied to Colombian volcanoes.
4. Physics-Mathematics: Especially interested in methods for solving differential equations with high degree of nonlinearity. Approximate solutions and exact solutions.

Peer-reviewed journals

See also: GOOGLE SCHOLAR: https://scholar.google.com/citations?user=-0InFfYAAAAJ&hl=en

1. D. Sierra-Porta, J.D. Petro-Ramos, D.J. Ruiz-Morales, D.D. Herrera-Acevedo, A.F. García-Teheran, M. Tarazona Alvarado (2024). Machine learning models for predicting geomagnetic storms across five solar cycles using Dst index and heliospheric variables. Advances in Space Research, Volume 74, Issue 8, Pages 3483-3495. https://doi.org/10.1016/j.asr.2024.08.031.
2. Sierra-Porta, D. (2024). A multifractal approach to understanding Forbush Decrease events: Correlations with geomagnetic storms and space weather phenomena. Chaos, Solitons & Fractals, 185, 115089. https://doi.org/10.1016/j.chaos.2024.115089.
3. Sierra-Porta, D., Tarazona-Alvarado, M., & Acevedo, D. H. (2024). Predicting sunspot number from topological features in spectral images I: Machine learning approach. Astronomy and Computing, 48, 100857. https://doi.org/10.1016/j.ascom.2024.100857.
4. Sierra-Porta, D. (2024). Assessing the impact of missing data on water quality index estimation: a machine learning approach. Discover Water, 4(1), 11. https://doi.org/10.1007/s43832-024-00068-y.
5. Sierra-Porta, D. (2024). Relationship between magnetic rigidity cutoff and chaotic behavior in cosmic ray time series using visibility graph and network analysis techniques. Chaos: An Interdisciplinary Journal of Nonlinear Science, 34(2). https://doi.org/10.1063/5.0167156.
6. Tarazona-Alvarado, M., & Sierra-Porta, D. (2023). Dataset for Sun dynamics from topological features. Data in Brief, 51, 109728. https://doi.org/10.1016/j.dib.2023.109728.
7. Tarazona Alvarado, M., Salamanca-Coy, J. L., Forero-Gutierrez, K., Núñez, L. A., Pisco-Guabave, J., Escobar-Diaz, F., & Sierra-Porta, D. (2024). Assessing and monitoring air quality in cities and urban areas with a portable, modular and low-cost sensor station: calibration challenges. International Journal of Remote Sensing, 45(17), 5713-5736. https://doi.org/10.1080/01431161.2024.2373338.
8. Porta, D. S., Acevedo, D. H., Tarazona-Alvarado, M., & Díaz, Y. H. (2023). SunspotCalc: Una aplicación basada en Web y Python para calcular la rotación diferencial del sol y su fotosfera. Revista Mexicana de Física E, 20(2 Jul-Dec), 020208-1. https://doi.org/10.31349/RevMexFis.20.020208.
9. Hahn, C., Wilson, M. J., Ruiz-Macias, O., Cole, S., Weinberg, D. H., Moustakas, J., ... & Zou, H. (2023). The DESI Bright Galaxy Survey: Final Target Selection, Design, and Validation. The Astronomical Journal, 165(6), 253. https://doi.org/10.3847/1538-3881/accff8
10. Sierra-Porta, D., Solano-Correa, Y.T., Tarazona-Alvarado, M. and de Villavsicencio, L.A.N., Linking PM10 and PM2.5 Pollution Concentration Through Tree Coverage in Urban Areas. CLEAN–Soil, Air, Water, 51, 5 2200222 (2023). https://doi.org/10.1002/clen.202200222.
11. Sierra-Porta, D., Tarazona-Alvarado, M., & Villalba-Acevedo, J. (2023). Quantitatively relating cosmic rays intensities from solar activity parameters based on structural equation modeling. Advances in Space Research, 72(2), 638-648. https://doi.org/10.1016/j.asr.2023.02.044.
12. Lan, T. W., Tojeiro, R., Armengaud, E., Prochaska, J. X., Davis, T. M., Alexander, D. M., ... & Zhou, Z. (2023). The DESI Survey Validation: Results from Visual Inspection of Bright Galaxies, Luminous Red Galaxies, and Emission-line Galaxies. The Astrophysical Journal, 943(1), 68. https://doi.org/10.3847/1538-4357/aca5fa

13. Sierra-Porta, D. (2022). On the fractal properties of cosmic rays and Sun dynamics cross-correlations. Astrophysics and Space Science, 367(12), 1-14. https://doi.org/10.1007/s10509-022-04151-5.
14. de León-Barrios R., Peña-Rodríguez J., Sanabria-Gómez J.D., Vásquez-Ramírez A., Calderón-Ardila R., Sarmiento-Cano C., Vesga-Ramírez A., Sierra-Porta D., Suárez-Durán M., Asorey H., Núñez L.A. (2022). Muography for the Colombian. Proceedings of Science, 395, art. no. 280.
15. J. E. Forero-Romero and D. Sierra-Porta. *On the Convergence of the Milky Way and M31 Kinematics from Cosmological Simulations*. The Astrophysical Journal, Volume 939, Number 1. https://doi.org/10.3847/1538-4357/ac92ea.
16. Sierra-Porta, David, and Andy-Rafael Domínguez-Monterroza. *Linking cosmic ray intensities to cutoff rigidity through multifractal detrented fluctuation analysis.* Physica A: Statistical Mechanics and its Applications 607 (2022): 128159. https://doi.org/10.1016/j.physa.2022.128159.
17. Jesús Peña-Rodríguez, Alejandra Vesga-Ramírez, Adriana Vásquez-Ramírez, Mauricio Suárez-Durán, Ricardo de León-Barrios, David Sierra-Porta, Rolando Calderón-Ardila, Jonathan Pisco-Guavabe, Hernán Asorey, José David Sanabria-Gómez, Luis Alberto Núñez. Muography in Colombia: simulation framework, instrumentation and data analysis. *Journal of Advanced Instrumentation in Science*, 271(1) 1-9 (2022). https://doi.org/10.31526/jais.2022.271.
18. R. de León-Barrios, J. Peña-Rodríguez, J.D. Sanabria-Gómez, A. Vásquez-Ramírez, R. Calderón-Ardila, C. Sarmiento-Cano, A. Vesga-Ramírez, D. Sierra-Porta, M. Suárez-Durán, H. Asorey, and Luis A. Núñez. Muography for the Colombian Volcanoes. *37th International Cosmic Ray Conference (ICRC 2021)*, 8 pages. Proceedings of Science, 2021, PoS(ICRC2021)280. https://doi.org/10.22323/1.395.0280.
19. D. Sierra-Porta. Efficient improvement for the estimation of the surface free energy of asphalt binder using Machine Learning tools. Revista UIS Ingenierías, Vol. 20, n.° 3, pp. 179-188 (2021), https://doi.org/10.18273-revuin.v20n3-2021013
20. A. Vesga-Ramírez and J. D. Sanabria-Gómez and D. Sierra-Porta and L. Arana-Salinas and H. Asorey and V. A. Kudryavtsev and R. Calderón-Ardila and L. A. Núñez. Simulated Annealing for Volcano Muography, arXiv 2005.08295 [physics.geo-ph]. *Journal of South American Earth Sciences* 109, 103248 (2021), https://doi.org/10.1016/j.jsames.2021.103248.
21. Sierra-Porta, D. Analytic Approximations to Liénard Nonlinear Oscillators with Modified Energy Balance Method. *J. Vib. Eng. Technol.* 8, 713–720 (2020). https://doi.org/10.1007/s42417-019-00170-9.
22. Sierra-Porta, D. Hydrogeochemical Evaluation of Water Quality Suitable for Human Consumption and Comparative Interpretation for Water Quality Index Studies. *Environ. Process.* 7, 579–596 (2020). https://doi.org/10.1007/s40710-020-00426-7.
23. A. Vesga-Ramírez, D. Sierra-Porta, J. Pena-Rodriguez, J.D. Sanabria-Gomez, M. Valencia-Otero, C. Sarmiento-Cano, M. Suarez-Duran, H. Asorey, L. A. Nunez. Muon Tomography sites for Colombian volcanoes. *Annals of Geophysics*, 63, 6, VO661, (2020), https://doi.org/10.4401/ag-8353.
24. J. Peña-Rodríguez, J. Pisco-Guabave, D. Sierra-Porta, M. Suárez-Durán, M. Arenas-Flórez, L.M. Pérez-Archila, J.D. Sanabria-Gómez, H. Asorey and L.A. Núñez. Design and construction of MuTe: a hybrid Muon Telescope to study Colombian volcanoes. *Journal of Instrumentation*, Volume 15 (2020). https://doi.org/10.1088/1748-0221/15/09/P09006.
25. Jesús Peña-Rodríguez, Adriana Vásquez-Ramírez, José D. Sanabria-Gómez, Luis A. Núñez, David Sierra-Porta, Hernán Asorey. Calibration and first measurements of MuTe: a hybrid Muon Telescope for geological structures. *36th International Cosmic Ray Conference (ICRC 2019)*, 9 pages. Proceedings of Science, 2019, https://doi.org/10.22323/1.358.0381.
26. Peña Rodríguez, J., Asorey, H., Hernández-Barajas, S., León-Carreño, F., Sierra-Porta, D., and Núñez, L. A. Calibración a nivel de Hardware de un detector Cherenkov de agua (Chitaga) en el arreglo GUANE para estudios de clima espacial. *Scientia Et Technica*, 23(4), 563-568 (2018). https://doi.org/10.22517/23447214.17511.
27. Asorey, H., R. Calderón-Ardila, K. Forero-Gutiérrez, L. A. Nuñez, J. Peña-Rodríguez, J. Salamanca-Coy, D. Sanabria-Gómez, J. Sánchez-Villafrades, and D. Sierra-Porta. MiniMuTe: A muon telescope prototype for studying volcanic structures with cosmic ray flux. *Scientia Et Technica*, 23(3), 386-391 (2018). https://doi.org/10.22517/23447214.17501.
28. Sierra-Porta, D. Cross correlation and time-lag between cosmic ray intensity and solar activity during solar cycles 21, 22 and 23. *Astrophys. Space. Sci.* 363, 137 (2018). https://doi.org/10.1007/s10509-018-3360-8.
29. Sierra-Porta, D. Some Algebraic Approach for the Second Painlevé Equation Using the Optimal Homotopy Asymptotic Method (OHAM). *Numer. Analys. Appl.* 11, 170–177 (2018). https://doi.org/10.1134/S1995423918020076.
30. H. Asorey, R. Calderón-Ardila, C. R. Carvajal-Bohorquez, S. Hernández-Barajas, L. Martínez-Ramírez, A. Jaimes-Motta, F. León-Carreño, J. Peña-Rodríguez, J. Pisco-Guavabe, J.D. Sanabria-Gómez, M. Suárez-Durán, A. Vásquez-Ramírez, K. Forero-Gutiérrez, J. Salamanca-Coy, L. A. Núñez and D. Sierra-Porta. Astroparticle projects at the Eastern Colombia region: facilities and instrumentation Proyectos en Astropartículas en la región Este de Colombia: iniciativas e instrumentación. *Scientia et Technica* Año XXIII, Vol. 23, No. 03 (2018). Universidad Tecnológica de Pereira. ISSN 0122-1701. https://doi.org/10.22517/23447214.17561.
31. Asorey, H., L. A. Núñez, J. Peña-Rodríguez, P. Salgado-Meza, D. Sierra-Porta, and M. Suárez-Durán. Proyecto RACIMO: desarrollo de una propuesta en torno a uso de las TIC, e-ciencia ciudadana, cambio climático y ciencia de datos. (2017). Primer Encuentro Latinoamericano de eCiencia, San José, del 3 al 5 de julio de 2017.
32. Sierra-Porta, D., Chirinos, M., and Stock, J.. Comparison of solutions to the Thomas-Fermi equation by a direct method and variational calculus. *Revista Mexicana de Física*, 63(4), 333 (2017).
33. Marling Juárez, Xandre Chourio, Joaquín Díaz-Lobatón, Ángel G. Muñoz, David Sierra-Porta, Gabriel A. Vecchi. (2017). El Niño, vientos de bajo nivel y predicción de rayos en el norte de Sudamérica. Boletín Técnico. Generación de información y monitoreo del Fenómeno El Niño. Instituto Geofísico del Perú (IGP). Vol 4, 11, 4-7. Instituto Geofísico del Perú (IGP).
34. Sierra-Porta, D., and Núnez, L. On the polynomial solution of the first Painlevé equation. *Int J Appl Math Res*, 6(1), 34 (2017).

35. Sierra Porta, D., Chirinos, M., and Stock, M. J. Comparison of variational solutions of the Thomas-Fermi model in terms of the ionization energy. *Revista mexicana de física*, 62(6), 538-542 (2016).
36. Khoudeir, A., and Sierra, D. Duality invariance in massive theories. *Physical Review D*, 91(6), 064015 (2015), https://doi.org/10.1103/PhysRevD.91.064015.
37. A Khoudeir y David Sierra Porta. DUALIDAD PARA ESPÍN 2 MASIVO. *Acta Cientifica Venezolana* 66 (3), 121-127 (2015)
38. Caldera, J. G., Porta, D. S., and Guerrero, C. Cosmología con campos escalares y ecuación de estado no-local (EEnL). *Ciencia*, 21(1) (2013).
39. Franceschini, P., González, L., Muñoz, Á., Sierra Porta, D., and Soldovieri, T. Effective potential for non-coupled stochastic partial differential equations. *Ciencia*, 16(3) (2010).
40. Muñoz, S., Sierra Porta, D., Soldovieri, T., Montiel, D., Rodríguez, R. O., Toro-Mendoza, J., and Rivero, L. Verhulst's Lagrangean and self-regulated systems. *Revista mexicana de física*, 52, 116-118 (2006).
41. Porta, David Sierra, and Germain Montiel. A note on the magnetic spherical pendulum. *Ciencia 17*, no. 4, 299-304 (2009).
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Books

1. Técnicas experimentales para físicos: Una introducción a las ciencias físicas. David Sierra Porta. Editorial Académica Española (November 22, 2011). Spanish, 104 pages. ISBN-10: 9783846561072, ISBN-13: 978-3846561072. https://www.amazon.com/T%C3%A9cnicas-experimentales-para-f%C3%ADsicos-introducci%C3%B3n/dp/384656107X.
2. Juego y Aprendo a Calcular. Carlos Eduardo Guédez Torrez & David Sierra Porta. Editorial Fe y Alegría (2006-05-04). ISBN 13978-980-6418-79-0, ISBN 10980-6418-79-4.

Thesis Tutoring-Mentoring

1. Director of Master's Thesis: Pronóstico de la tasa de cambio representativa del mercado colombiano (TRM) con redes neuronales recurrentes LSTM. Maestría en Estadística Apliacda y Ciencia de Datos de la Universidad Tecnológica de Bolívar (2024). Thesis writer: Yuleidis Mesa González.
2. Director of Master's Thesis: Nivel de procrastinación en estudiantes de la Universidad Tecnológica de Bolivar. Maestría en Estadística Apliacda y Ciencia de Datos de la Universidad Tecnológica de Bolívar (2024). Thesis writer: Rafael David Cueto Rodríguez.
3. Director of Master's Thesis: Análisis de Impacto de la Estrategia ALEKS en el Rendimiento Académico de Estudiantes de la Universidad Tecnológica de Bolívar: Una Evaluación en el Contexto de Cálculo Diferencial. Maestría en Estadística Apliacda y Ciencia de Datos de la Universidad Tecnológica de Bolívar (2024). Thesis writer: Humberto Manuel Marbello Pena.
4. Director of Master's Thesis: Revelando complejas interacciones entre el Índice de Desarrollo Humano y los Objetivos de Desarrollo Sostenible: Un análisis basado en el aprendizaje automático. Maestría en Estadística Apliacda y Ciencia de Datos de la Universidad Tecnológica de Bolívar (2024). Thesis writer: Hugo Alberto Forero Guerra.
5. Director of Master's Thesis: Optimización del tratamiento para controlar el colesterol LDL usando modelos de inteligencia artificial. Maestría en Estadística Apliacda y Ciencia de Datos de la Universidad Tecnológica de Bolívar (2024). Thesis writer: Deiby Jhon Boneu Yepez.
6. Co-Director of Master's Thesis: Inversion geofisica a partir de datos de datos de muongrafia volcanica para proyecto MuTe. Maestría en Geofísica. Universidad Industrial de Santander. 2016. Thesis writer: Maria Alejandra Vesga Ramirez.
7. Undergraduate Thesis Tutor: Soluciones semi-exactas a la Ecuación de Thomas-Fermi. Thesis writer: Br. María Chirinos. Licenciado en Física. Facultad Experimental de Ciencias. La Universidad del Zulia. Mayo de 2016.
8. Master's Thesis Tutor: Soluciones esféricamente simétricas de las ecuaciones de Einstein + términos no-polinomiales y su efecto en la geometría del espacio-tiempo. Thesis writer: Guerrero Ruíz, Jefferson José. Magister Scientiarum en Física. Facultad Experimental de Ciencias. La Universidad del Zulia. Enero de 2011.
9. Master's Thesis Tutor: Cosmología con campos escalares y ecuación de estado Nolocal. Thesis writer: José Gerardo Caldera. Magister Scientiarum en Física. Facultad Experimental de Ciencias. La Universidad del Zulia. Marzo de 2010.
10. Master's Thesis Tutor: Estudio teórico de un péndulo esférico bajo la acción de un campo magnético tipo monopolo. Thesis writer: Montiel Cubillan, Germain Andrés. División de Estudios de Postgrado de la Facultad de Ingeniería. Universidad del Zulia. Postgrado en Física Aplicada. Facultad de Ingeniería. Diciembre 2007.

Interests

- **Data Science, Computational Tools of Data Science, Robust algorithms for Artificial Inteligence, Machine Learning, Deep Learning, Data Mining, Scientific Visualization.**
- I am particularly interested in atmospheric dynamics, air quality, and water quality, and how data science can be applied to evaluate, describe, and study these processes.
- I am deeply interested in solar dynamics, the influence of the solar wind, and heliospheric conditions on Earth, including cosmic rays and low- and high-energy astroparticles. I also explore the various applications of cosmic rays in scientific research.
- Mathematical Physics, Mathematical Methods, Experimental Physics, Modeling of Natural Phenomena, Data Science, Data Analysis, General Relativity. Gravitation and Cosmology. Analytical Mechanics.

- Teaching at middle school, high school, diversified, professional, secondary and high school levels. Teaching and research in university higher education.
- Outdoor sports, running, cycling, etc.

Skills

Computer Science Python, R, Maple, Mathematica Software, SPSS, PSPP, Origin, LaTeX, OverLeaft, OpenOffice, Excel-Microsoft, Word-Microsoft, Linux, Microsoft Windows, Gimp, Kadabra.
Communication More than 20 publications in indexed and refereed journals (publications attached). Oral presentation in congresses and events through conferences.
Teaching at different levels of secondary and university education. Group management and excellent command of skills for communication and administration of learning processes.
Experimental and Theoretical Physics and Mathematics. Experience in tensor calculus and techniques in General Relativity and Cosmology. Study of systems and theories in Quantum Field Theory in several dimensions. Study of systems in the context of theoretical mechanics and theoretical physics in general.

Languages

Spanish: Native proficiency, Native Language
English: Upper intermediate level in verbal communication, writing and reading. B2 Level. APTIS - British Council.
Galego: Limited proficiency.

Professional References

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