Juan Montoya Sanchez

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Profile

Enthusiastic Physics student deeply interested in High-Energy Physics (HEP). Hands-on experience in data analysis, software development (C++, Python), and collaborative research in an academic group affiliated with the CMS experiment at CERN. Keen to apply theoretical knowledge to real-world research projects and contribute to cutting-edge scientific discoveries.

Education

Universidad de Antioquia 2019 – *Expected* 2026
Bachelor of Physics

Research Experience

High-Energy Physics Group (GFIF), Universidad de Antioquia 2023 – Present

- Collaborate on low-p_T (< 30 GeV) b-jet analyses using C++ in conjunction with the CMS experiment at CERN.
- Implement data processing pipelines to study jet properties and improve event selection criteria.
- Investigate new strategies for tagging b-jets in high-luminosity collision data.

Conferences & Presentations

9$^{\text{th}}$ Colombian Meeting on High Energy Physics (COMHEP), Pasto December 2024

- *Oral Presentation: Estudio sistemático de la estructura de jets de b y $\bar{b}$ a bajo p_T.*

ICTP Physics Without Frontiers: Colombian Network for High Energy Physics School, Ibagué November 30 – December 2, 2023

- Attended a specialized school focused on theoretical and experimental high-energy physics.
- Participated in workshops and lectures led by renowned international researchers.

8$^{\text{th}}$ Colombian Meeting on High Energy Physics (COMHEP), Ibagué December 4 – 7, 2023

- Attended talks and discussions covering key topics in experimental and theoretical high-energy physics.

Additional Projects

United Nations Datathon 2024 – Sustainable Tourism Analysis
GitHub Link

- Analyzed large tourism datasets to highlight sustainability metrics.
- Created interactive data visualizations using Python libraries (`geopandas`, `plotly`) for global insights.

NASA International Space Apps Challenge 2024 – Galactic Problem Solver
GitHub Link

- Awarded the "Galactic Problem Solver" certificate for outstanding participation.
- Developed innovative data visualization techniques representing climate patterns using Python.
- Collaborated with a multidisciplinary team to address challenges in space and Earth-related contexts.

Tutoring Experience

Tutor at Tutor.com November 2024 – Present

- Provide online math and physics tutoring to students with diverse academic backgrounds.
- Tailor explanations to different learning styles, enhancing conceptual understanding.

Skills

Programming:

- C++ (HEP software, object-oriented design)
- Python (data analysis, visualization)
- Bash (basic automation, Linux environment)
- Julia (initial learning phase)

Tools:

- LaTeX (scientific writing)
- Linux (Debian-based systems)
- ROOT (desirable for HEP data analysis, if applicable)

Languages:

- English (B2)
- Spanish (Native)

Soft Skills:

- Problem-solving
- Teamwork & Collaboration
- Adaptability