Curriculum Vitæ

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Summary

- Physics engineer with extensive experience in computing, scientific software and data processing
- Teaching experience in multiple settings
- Event organizer and Science outreach

Research Experience

Present – Oct '21 — **Particle Physics PhD**
The prestigious "Bourse Monge" was awarded.
→ Data analysis @ CMS/CERN: HH → bb$\tau\tau$
→ Detector work for the future High Granularity Calorimeter
big data processing, develop custom frameworks used by others, develop visualization web app, apply statistical techniques, presentations to international audiences, work in a large team
→ Teacher Assistant for Physics and NMR labs
Location: École Polytechnique, Paris, France

Sep '21 – July '21 — **Research @ ALICE**
→ Beam focusing simulations for direct flow measurements
beam simulation and visualisation under multiple magnets
Location: Physikalisches Institut, Heidelberg, Germany

June '21 – May '19 — **CERN Research Fellowship**
→ Future HGCAL calorimeter performance studies [CMS DN-2020/001]
→ Reconstruction code design and porting to GPUs
→ Clustering algorithm validation using testbeam data [CMS DN-2021/005]
→ Deep learning for particle identification and energy regression
data analysis, GPU computing, machine learning techniques
Location: CERN, Geneva, Switzerland

Apr '19 – Jul '18 — **Deep Learning Internships**
→ GANs as outlier detectors for future JWS Telescope data
→ CNNs for unveiling history of galaxy mergers (LEAPS Summer Program)
data analysis, develop custom machine learning framework
Location: Swinburne Univ. Technology (Australia) and Leiden University (Netherlands)

Education

Jun '18 – Sep '12 — **Engineering Physics MSc**
Thesis grade: 19/20
→ Thesis: Measurement of b-quark fragmentation fraction ratios at the CMS experiment: a key ingredient for the $B_s^0 \to \mu\mu$ rare decay analysis [CMS AN-2017/168]
Location: Instituto Superior Técnico & LIP, Lisbon, Portugal

Dec '15 – Aug '15 — **Erasmus**
→ Top-1% score in Particle Physics
Location: University of Amsterdam, Netherlands

Publications

2022 **20th International Workshop on Advanced Computing and Analysis Techniques in Physics Research (ACAT21)**
→ **B. Alves**, F. Pantaleo, and M. Rovere. Clustering in the Heterogeneous Reconstruction Chain of the CMS HGCAL Detector, in press

2021 **25th International Conference on Computing in High-Energy and Nuclear Physics (vCHEP2021)**
→ **B. Alves**, A. Bocci, M. Kortelainen, F. Pantaleo, and M. Rovere. Heterogeneous techniques for rescaling energy deposits in the cms phase-2 endcap calorimeter. *EPJ Web Conf.*, 251:04017, 2021. doi: 10.1051/epjconf/202125104017. URL `https://doi.org/10.1051/epjconf/202125104017`

Skills

Teaching
Teacher assistant @ École Polytechnique Paris: 1st and 3rd year University students
AfterSchool: teach "Algorithms 1" as a volunteer to school students
Maths teacher: Red Cross volunteer, extremely challenging environment
Student co-supervision: "Search for rare $W \to \pi\gamma$ and $W \to \pi\pi\pi$ in top events" [report]
Supervision of students working on HGCAL GPU-related efforts at CERN

Languages
Portuguese/Italian (native), English (fluent), French (advanced), German (intermediate)

Communication
Excellent communication skills: organization of international events, participation in workshops, presentations in international meetings, conferences, posters and schools.
• Secretary of the CMS Young Scientist Committee and head organizer of its Job Matching Event
• Science outreach in Lisbon, Vienna, Melbourne and Paris in Portuguese, English and French
• Shifts at CERN: up to 2 weeks continuous commitment to ensure proper experiment functioning

Computing
Almost ten years' experience using Linux. Thorough understanding of Python/C/C++/CUDA framework development for international collaborations. Very familiar with data science, visualization and statistics packages, machine learning and GPU computing. Enthusiast for new algorithms and data structures. Daily usage of code versioning and workflow management tools.

Schools, Conferences, additional Internships

2023 Poster Talk at CMS Week: "Current studies on the CMS run2 $HH \to bb\tau\tau$ resonant analysis"

2022 Conference Talk at QCD@LHC2022: "Techniques for SMEFT Fit"
Invited Reviewer for the ACAT21 Conference

2021 Workshop Talk at PyHEP21: Data Visualization with Bokeh
Presentation @ 11th CMS Induction Course: "GPU's: the future of CMS software"

2020 Posters@LHCC (CERN): Performance studies in HGCAL

2019 Efficient Scientific Computing School (Bertinoro, Italy): Poster presentation
CERN OpenLab courses: Parallelism & Efficient Programing

2017 Universitat Wien: lab work at the Particle Accelerator Mass Spectrometry Laboratory (VERA)

2016 CERN Summer Student Programme
→ Search for the $B_c(2S)$ meson at CMS [report]
→ "ρ factor" studies for prompt J/ψ and $\psi(2S)$ polarization measurements.