Curriculum Vitæ

Name: Bruno Alves
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Experience

Present – July 2021 | **Research Associate @ ALICE**
→ Impact of beam focusing on direct flow measurements
Supervisors: Dr. Alexander Schmah
Location: Physikalisches Institut, Heidelberg University, Germany

June 2021 – May 2019 | **CERN: High Granularity Calorimeter**
→ Performance studies of silicon wafers with electromagnetic showers [CMS DN-2020/001]
→ Reconstruction code design and porting to GPUs using CUDA [included in HLT TDR; integrated in CMSSW; paper approved by conveners and accepted at vCHEP2021]
→ Validation of clustering and position measurement algorithms using testbeam data with electromagnetic [CMS DN-2021/005] and hadronic showers [on-going]
→ Deep learning studies for particle identification and energy regression [developed workflow management system from scratch]
Supervisors: Dr. P. Silva, Dr. M. Rovere, Dr. F. Pantaleo, Dr. A. David

Apr 2019 – Sep 2018 | **Machine Learning**
→ GANs as outlier detectors for future JWS Telescope data
Supervisor: Prof. Dr. K. Glazebrook
Location: CAS, Swinburne Univ. Technology, Melbourne, Australia

Aug 2018 – Jul 2018
→ CNNs for unveiling history of galaxy mergers (LEAPS Summer Program)
Supervisors: Dr. M. X. Cai, Dr. J. Bédorf
Location: Leiden University, Netherlands

Sep 2016 – Jul 2016 | **CERN Summer Student Programme**
→ Search for the $B_c(2S)$ meson at CMS [CERN-STUDENTS-Note-2016-209]
→ "ρ factor" studies for prompt J/ψ and $\psi(2S)$ polarization measurements.
Supervisors: Dr. F. Fiori, Dr. I. Kratschmer, Dr. C. Lourenço

Education

Jun 2018 – Sep 2012 | **Engineering Physics M.Sc., Lisbon University, IST**
Average score: 17/20; 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]
Supervisors: Prof. Dr. Nuno Leonardo, Prof. Dr. João Varela
Location: IST & LIP, Lisbon, Portugal

Dec 2015 – Aug 2015 | **Erasmus at the University of Amsterdam**
Average score: 8/10
→ The average score includes a top-1% score in Particle Physics

Paper

2021 | **25th International Conference on Computing in High-Energy and Nuclear Physics (vCHEP2021)**
→ Alves B. et al. (in press). Heterogeneous techniques for rescaling energy deposits in the CMS Phase-2 endcap calorimeter. *EPJ Web of Conferences*.

Schools & Presentations

2021 **Tutorial on Data Visualization with Bokeh @ PyHEP21**
→ Tutorial on binder / Published with DOI / Embedded online examples

Presentation @ 11th CMS Induction Course
→ GPU's: the future of CMS software

2020 **Posters@LHCC (CERN)**
→ HGCAL: Evaluation of the impact of different partial silicon wafer geometries in the response to electromagnetic showers

2019 **Efficient Scientific Computing School (Bertinoro, Italy)**
→ Examination passed successfully
→ Poster presentation

OpenLab courses (CERN)
→ Programming and environments for parallelism
→ Computer architecture and efficient programming

Grants & Awards

2021 **PhD grant (LLR, Paris, 3 years)**
→ The prestigious *Bourse Monge* from *École Polytechnique* was additionally awarded.

2018 **Machine Learning grant (CAS, Melbourne, 7 months)**

Machine Learning Summer School grant (Leiden Univ., 2 months)
→ Around 60 candidates per project

2017 **M.Sc. grant (Lisbon Univ., 6 months)**

2016 **Winner: LIP Técnico Particle Challenge (LIP, Lisbon, 6 months grant)**
→ Written questions + Oral presentation

Skills

Computing
- Proficient: Python, C, C++, Shell / Beginner: Latex, SQL, Julia, Lisp
- Scientific packages: numpy, scipy, pandas, h5py, (conda), ...
- Visualization: bokeh (+ custom wrapper), matplotlib
- Machine learning: tensorflow, keras, scikit-learn
- GPU computing: CUDA (plus advanced memory management in C++)
- Code versioning and contributions: git
- Code workflow management: luigi
- Automated job submission to computer clusters
- CERN specific: CMS-SW, ROOT and tools from scikit-hep

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

Communication Excellent communication skills developed thanks to frequent meetings at CERN, talks given in multiple countries and languages, poster presentations and presentations for schools.

Supervision
- CERN Summer Student 2020 co-supervisor (Danilo Petricevic): search for rare $W \to \pi\gamma$ and $W \to \pi\pi\pi$ in top events [CERN-STUDENTS-Note-2020-014]
- Two students working on HGCAL GPU-related efforts: Si Tong An, Abhishek Das

Hobbies Yoga, mandarin, chess

Other Tutor experience as a Red Cross volunteer

Heidelberg, on the 7th of July 2021