CAIO LAGANÁ FERNANDES

Ph.D Physicist

ML Engineer

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SUMMARY

Possess a Ph.D. in High Energy Nuclear Physics at the European Organization for Nuclear Research (CERN). Awarded the Best Doctorate Thesis Prize by the Brazilian Physical Society in 2020. Experienced in machine learning, software development and data analysis.

SKILLS

Portuguese (native)
English (fluent)
Italian (fluent)
French (functional)

Ability to understand complex systems and work out efficient solutions to intrincate problems

PROJECTS

C++ **Hypernuclei Search at CERN** **https://github.com/caiolagana/LnnTTreeCreator**
This C++ project was written as part of my Ph.D program. The script was ran over thousands of terabytes of data at CERN's computing infrastructure. It searchs for the Λnn and Λpn hypernuclei in high-energy Pb-Pb collisions at the Large Hadron Collider.

Visual C#, SQL **Hydroelectric Power Plant Simulator** **https://github.com/caiolagana/PowerPlantSimulator**
Project written in Visual C# simulating the full scope of a hydroelectric power plant for training operators. A depth-search recursive algorithm is responsible for the electricity power flow, while numerical solution to differential equations emulates the machines.

Python, AngularJS **AI Analysis of Legal Documents** **https://github.com/e-fluxus/ia**
I am the head of a project utilizing Artificial Intelligente to extract and analyze data from legal documents. Written in python's FastAPI, integrated with MongoDB and served in a Docker container at AWS. Integrates with an AngularJS front-end.

Python, TensorFlow **Deep Learning Neural Network** **https://github.com/caiolagana/DeepLearningPython**
This is my own implementation of Michael Nielsen's deep learning neural network. An implementation of the same model is performed with TensorFlow.

Python, TensorFlow **Multi-Class Sentiment Analysis** **https://github.com/caiolagana/MultiClassSentimentAnalysis**
This project performs a multi-class sentiment analysis for identifying different types of legal documents in a same PDF. It uses TensorFlow and Keras to build a neural network.

FORMAL EDUCATION

2013 - 2017 **Doctorate in Physics** **USP/CERN**
University of São Paulo (USP) with one-year exchange program at European Organization for Nuclear Research (CERN). *Title:* Evidence for the existence of the Λnn hypernucleus with the ALICE detector

2010-2012 **Master's in Physics** **UNESP**
State University of São Paulo (UNESP) *Title:* Femtoscopia de colisões próton-próton no detector CMS do Large Hadron Collider

2006-2010 **Bachelor's in Physics** **USP**
Scholarship from Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq)

COMPLEMENTARY EDUCATION

2012 **Excellence in Detectors and Instrumentation Technologies** **Fermilab**
Fermi National Accelerator Laboratory, Illinois (US)

2012 **Short Term Course in Laboratory Techniques** **BNL**
Brookhaven National Laboratory, Upton (US)

2010 **Short Term Course in Data Analysis Tools at CERN** **CERN**
European Organization for Nuclear Research, Meyrin (Switzerland)

EXPERIENCE

2014 **Assistant Professor** **IFUSP**
- Working hours (weekly): 6h
- Course: Laboratório de Física Moderna

2017 - 2019 **Visual C# Developer** **AQS Tecnologia**
- Working hours (weekly): 40h

2019 **Scientific Journal Referee** **USP**
- Physical Science International Journal

2020 **Scientific Journal Referee** **USP**
- Caderno Brasileiro de Ensino de Física

2021 **Assistant Professor** **POLI-USP**
- Working hours (weekly): 6h
- Course: Física III

2022 - Current **Python Developer** **E-FLUXUS**
- Working hours (weekly): 40h

AWARDS

2013 **Best Panel Prize of the XXXVI Reunião de Trabalho sobre Física Nuclear no Brasil** **SBF**
Master's Degree

2020 **Best Doctorate Thesis Prize by the Brazilian Physical Society** **SBF**
Doctorate Degree

PUBLICATIONS

2018 **Production of deuterons, tritons, ^{3}He nuclei, and their antinuclei in pp collisions**
Phyis. Rev. C **97** p.024615

2018 **Production of ^{4}He and $^4\overline{\text{He}}$ in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV at the LHC**
Nucl. Phys. A **971** p.1-20

2017 **Measurement of the mass difference between top quark and antiquark in pp collisions**
Phys. Lett. B **770** p.50-71

2016 **$^3_\Lambda$H and $^3_{\overline{\Lambda}}\overline{\text{H}}$ production in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV**
Phys. Lett. B **754** p.360-372

2015 **Precision measurement of the mass difference between light nuclei and anti-nuclei**
Nature Physics **11** p.811-814

2015 **Two-pion femtoscopy in p-Pb collisions at $\sqrt{s_{NN}} = 5.02$ TeV**
Phys. Rev. C **91** p.034906

2014 **Spectroscopic version of the Aharonov-Bohm effect**
C. Laganá Fernandes, arXiv:1403.6700

2013 **Decaimentos nucleares em uma câmara de nuvens**
C. Laganá Fernandes, Revista Brasileira de Ensino de Física **35** p.3314

2011 **Estudo de raios cósmicos utilizando uma câmara de nuvens de baixo custo**
C. Laganá Fernandes, Revista Brasileira de Ensino de Física **33** p.3302