



Experimental High Energy Physics in Colombia

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ATLAS experiment



II Latin American Strategy Forum for Research Infrastructure:
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HEP experiments

- LHC experiments
- Neutrino experiments
- Cosmic-ray experiments



LHC experiments: timeline

- 2006: Universidad de los Andes joins CMS
- 2007: Universidad Antonio Nariño joins ATLAS
- 2014: Universidad Nacional de Colombia joins LHCb
- 2016: Universidad Industrial de Santander joins ALICE
- 2019: Universidad de Antioquia joins CMS
- 2020: Universidad Nacional de Colombia joins ATLAS



LHC experiments: Physics

- ATLAS: Searches for beyond standard model signatures; Charged Higgs, SUSY, Invisible Higgs, HNL
- CMS: Supersymmetry, HNL searches, DM searches and B physics
- LHCb: Charm quark physics, and Quarkonia-Exotics
 B_c meson decays for leptonic universality tests
B meson differential cross section production measurements



LHC experiments: Instrumentation and Service tasks

- ATLAS: Distributed computing shifts (remote), upgrade of the new inner detector (ITk) and ATLAS control network
- CMS: GRID maintenance and operation, Muon RPC detectors DAQ system & upgrade GEM detectors
- LHCb: Tracker association tool for reconstruction efficiency improvement in events with ghost tracks
- ALICE: SAMPA chips for TPCs
- Other efforts in accelerator physics and particle detectors



Neutrino experiments: timeline

- 2015: Universidad del Atlántico joins NOvA
- 2017: Universidad Antonio Nariño and Universidad Sergio Arboleda join DUNE
- 2019: Universidad del Magdalena joins NOvA
- 2019: Universidad EIA joins DUNE



Neutrino experiments

- NOvA: Data analysis, electron neutrino appearance, Non-standard interactions, Near detector physics, Neutrino cross-section
- DUNE: Photon detection system (electronics and hardware design), Detector electronics, Simulation, firmware development

* See D. Moreno's talk for more details



Cosmic-ray experiments

- 2010: UIS joins LAGO
- 2015: UIS joins The Pierre Auger Observatory
- 2018: Universidad de Medellín joins The Pierre Auger Observatory
- Auger: Cosmic ray Air showers modelling and simulation and atmospheric phenomena
- LAGO: Development, construction and operation of Water Cherenkov Detectors, development of new electronics, DAQ custom system development



Universidad
Industrial de
Santander

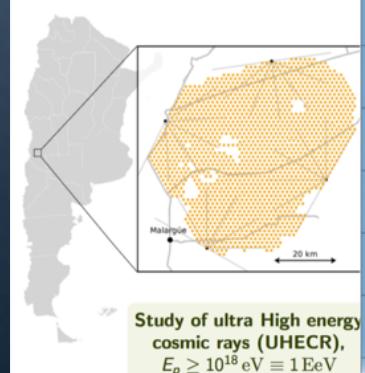


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The Latin American Giant Observatory (LAGO)

The Pierre Auger Observatory
J. Abraham et al., NIM A523:1-2(2004)50



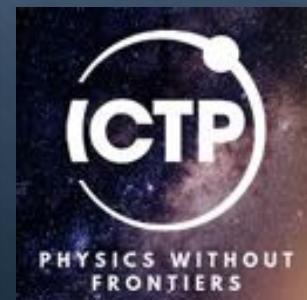
HEP experiments: going beyond

- The experience gained by all the groups has led to other projects
- Applications:
 - Instrumentation Lab @UniAndes
 - MuTe, RACIMO @ UIS
- Outreach and Education:
 - Schools
 - Masterclasses
 - Open Data
 - ICTP-Physics Without Frontiers
 - CEVALE2VE: Network for HEP education
 - LA-CoNGA: Latin American Alliance for Capacity building in Advanced Physics
 - Networks: CONHEP



Latin american Alliance for
Capacity buildiNG in Advanced physics

LA-CoNGA physics



Colombian Network on High Energy Physics (CONHEP)

- 15 institutions, 40 Physicists
- Theory and Experiment
- Colombian meeting on HEP since 2016
- Colombian Teachers program at CERN
- Outreach seminars, public talks, ...

