

# Pernié Luca

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## CAREER & EDUCATION

### POSTDOCTORAL FELLOW IN HIGH ENERGY PHYSICS

Texas A&M University  
2015-present

### PH.D. IN HIGH ENERGY PHYSICS

Université Libre de Bruxelles  
Università di Roma La Sapienza  
2011-2015 (GPA not assigned)

### MASTER'S DEGREE IN PARTICLE PHYSICS

Università di Roma La Sapienza  
2006-2011

## SKILLS

### COMPUTING:

Phyton • C • C++ • Bash •  $\text{\LaTeX}$  •  
Git • SVN

### LIBRARIES:

Keras • Theano • numpy • SciPy •  
pandas

### LANGUAGES:

Italian • English • Spanish •  
French (basic)

### INTERPERSONAL SKILLS:

Leadership • Management •  
Working under pressure •  
Event Planning • Effective  
Communication • Public Speaking

## AWARDS

2017 CMS Achievement Awards:  
outstanding contribution to the MUON  
project in CMS.

Postdoctoral research symposium:  
distinguished postdoctoral flash talk,  
Texas A&M University

One year grant as CERN-INFN  
associate (CERN fellow position)

## INTERESTS

Experimental High Energy Physics  
Data analysis  
Deep Learning  
Software Engineering  
Management

## EXPERIENCE

I work for the CMS experiment at the European Center for Nuclear Research (CERN). The CMS experiment is a one of the largest physics collaboration in the world, counting more than 6000 people among physicists, engineers, and technicians.

### LEADERSHIP AND SERVICE

- Alignment, Calibration and Databases manager. This role is an management position under the Physics Performance Dataset project. Responsibilities include the coordination of all the activities related to production and consumption of detector conditions.
- Member of the Muon Detector Performance Group Office. The group is charged with the coordination of the three muon detector subsystems to have the best performance of the muon system.

### PHYSICS ANALYSIS

- Coordinator of the data analysis for the search of beyond the Standard Model light bosons decaying into muon pairs.
- Coordinator of the data analysis for the search of resonant di-Higgs production in the  $H \rightarrow hh \rightarrow WWbb \rightarrow ll\nu\nu bb$  decay channel.
- Measurement of the Z boson pair-production cross section in proton-proton collisions at 7 and 8 TeV.
- Search for the Higgs boson in the  $H \rightarrow ZZ \rightarrow 2l2\nu$  decay channel in pp collisions with the CMS detector.
- Search for High mass Higgs boson into the  $WW \rightarrow WW \rightarrow l\nu jj$ .

### DETECTOR & INSTRUMENTATION

- Coordinator of the track-based alignment of the CMS muon system.
- Radiation hardness studies for the High Luminosity upgrade of the CMS muon system.
- Developed a framework for the inter-calibration of the CMS electromagnetic calorimeter crystals through neutral pions.
- Studies of the impact of precise timing for the phase-2 upgrade of the CMS experiment.

## OUTREACH ACTIVITY

- Machine Learning Techniques in Science (organizer): three seminars with the purpose of offering an opportunity for graduate students and postdocs to get a kick-start into being able to apply ML technique.
- High Energy Physics Experiment Cosmology seminar (organizer): a series of seminars attended by the members of both the experimental and theory communities, including faculty, postdocs, researchers, graduate and undergraduate students of Texas A&M University.
- A walk through the Large Hadron Collider (organizer): part of the Physics and Engineering Festival at Texas A&M University that gathers over 5000 visitors annually from across the United States.
- Official guide of the CMS experiment: tours of the CMS experimental facility in English, Spanish, and Italian.

## SELECTED PUBLICATIONS

Full list of publications (over 400 as a member of CMS Collaborations) is available upon request, or it can be accessed through this [link](#).

## REFEREED JOURNAL PUBLICATION

Huang T., Pernié L. et al., “Resonant Di-Higgs Production in the  $bbWW$  Channel: Probing the Electroweak Phase Transition at the LHC”, Phys. Rev. D 96 (2017).

CMS Collaboration, “A search for beyond the Standard Model light bosons decaying into muon pairs at CMS”, paper in preparation.

CMS Collaboration, “Measurements of the  $ZZ$  production cross sections in the  $2l2\nu$  channel in proton-proton collisions at  $\sqrt{s} = 7$  and 8 TeV and combined constraints on triple gauge couplings”, Eur. Phys. J. C 75 (2015).

Brianza L., Pernié L. et al., “Response of microchannel plates to single particles and to electromagnetic showers, NIMA vol. 797 (2015).

CMS Collaboration, “Track-based alignment of the CMS muon system, paper in preparation.

CMS Collaboration, “ $H \rightarrow aa \rightarrow 2\mu 2\tau$  with 2016 dataset”, analysis review committee, HIG-17-029, To be submitted.

CMS Collaboration, “Search for SUSY with multileptons in 13 TeV data”, analysis review committee, CERN-EP-2017-243, Submitted to JHEP.

ATLAS Collaboration, “Search for dark matter produced in association with a Higgs boson decaying to  $bb$  using  $36 \text{ fb}^{-1}$  of pp collisions at  $\sqrt{s} = 13$  TeV with the ATLAS detector”, External referee, CERN-EP-2017-117, Submitted to Phys. Rev. Lett.

CMS Collaboration, “Search for a Higgs boson in the mass range from 145 to 1000 GeV decaying to a pair of W or Z bosons”, J. High Energy Phys. 10 (2015).

CMS Collaboration, “Search for a standard-model-like Higgs boson with a mass in the range 145 to 1000 GeV at the LHC”, Eur. Phys. J. C 73 (2013).

## SELECTED INTERNATIONAL CONFERENCES

A more extensive list of conferences can be found in my CV, available at this [link](#).

12/2017. Mumbai, India. SUSY17: 25th International Conference on Supersymmetry and the Unification of Fundamental Interactions. Title: Searches for long-lived particles and other non-conventional signatures.

06/2017: Madrid, Spain. PASCOS17: Particle physics, String theory and COSmology, Madrid. Title: Searches for extended Higgs sectors with the CMS experiment.

02/2017. Santa Fe, New Mexico: Jets and Heavy Flavor 2017, Los Alamos National Laboratory. Title: CMS measurements of the Higgs, Higgs properties, and BSM searches.

10/2016. University of Massachusetts Amherst. Invited seminar. Title: Resonant di-Higgs production in the  $bbWW$  channel: probing the electroweak phase transition at the LHC.

05/2016: Pittsburgh. Pheno2016: Phenomenology 2016 Symposium. Title: Extended Higgs searches at the CMS experiment.

05/2016. College Station, Texas: Mitchell Workshop on Collider and Dark Matter Physics. Title: Search for Beyond Standard Model Higgs with the CMS experiment.

03/2015. CERN, Switzerland: LHCC (poster session). Title: Simulation studies on precise timing information during High Luminosity LHC.

09/2013: Como, Italy: 14th ICATPP Conference on Astroparticle, Particle, Space Physics and Detectors for Physics Applications. Title: Evolution of the response of the CMS ECAL, and upgrade design options for electromagnetic calorimetry at the HL-LHC.

08/2013: Moscow, Russia: 16th Lomonosov Conference on Elementary Particle Physics;  $ZZ$  cross section measurements and limits on anomalous coupling constants for neutral triple gauge boson.