

# Luca Pernié

## Curriculum Vitae

### Education

- 2011-2015 **Ph.D.**, *Université Libre de Bruxelles; Sapienza Università di Roma.*  
Advisers: Pascal Vanlaer: Chargé de cours at the Université Libre de Bruxelles.  
Daniele Del Re: Assistant Professor at Sapienza Università di Roma.
- 2006-2011 **M.S.**, *Sapienza Università di Roma, Grade: 110/110.*  
Adviser: Daniele Del Re: Assistant Professor at Sapienza Università di Roma.

### Research Experience

- 2015-present **Postdoctoral fellow**, *Texas A&M University.*  
Adviser: Alexei Safonov, professor at Texas A&M University
- Physics analysis**  
Search for Beyond the Standard Model light bosons decaying into muon pairs.  
Search for resonant di-Higgs production into the  $H \rightarrow hh \rightarrow WWbb \rightarrow \nu\nu b\bar{b}$  decay channel.
- Detector & Instrumentation**  
Track-based alignment of the CMS muon system.  
Radiation hardness studies for the High Luminosity upgrade of the CMS muon system.
- Leadership and Service**  
Co-convenor of the Alignment, Calibration and Databases group in the Physics Performance Detector project of the CMS experiment (Level 2 convenership).  
Member of the Muon Detector Performance Group Office at the CMS experiment: muon system alignment coordinator.
- 2011-2015 **Graduate researcher**, *Université Libre de Bruxelles; Sapienza Università di Roma.*
- Physics analysis**  
Measurement of the Z boson pair-production cross section in proton-proton collisions at 7 and 8 TeV with the CMS detector, and limits on anomalous triple gauge couplings.  
Search for the Higgs boson in the  $H \rightarrow ZZ \rightarrow 2l2\nu$  decay channel in pp collisions with the CMS detector.
- Detector & Instrumentation**  
Inter-calibration of the CMS electromagnetic calorimeter crystals.  
Studies of the impact of precise timing for the phase-2 upgrade of the CMS experiment.

4050 Pendleton Drive, Bryan 77802 – Texas, U.S.A.

☎ +19792640374 • ✉ luca.pernie@cern.ch • 📄 lpernie.github.io

2006-2011 **Undergraduate researcher**, *Sapienza Università di Roma*.

### Physics analysis

Search for a Standard Model Higgs boson in the  $H \rightarrow WW \rightarrow l\nu jj$  decay channel at the CMS experiment.

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## Awards

- 01/2018 CMS Achievement Awards: outstanding contribution to the MUON project in CMS. The annual CMS Achievement Awards honor individuals who have distinguished themselves by performing significant and lasting contributions to different components of the CMS experiment
- 09/2016 Postdoctoral research symposium: distinguished postdoctoral flash talk, Texas A&M University
- 01/2014-15 One year grant as CERN-INFN associate (fellow position at CERN)

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## Extra-curricular and outreach activities

- 11/2017 “*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.
- 04/2017 “*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.
- 2016-17 “*High Energy Physics Experiment Cosmology (HEPEC) 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.
- 09/2014-17 “*Official guide*” of the CMS experiment, tours of the CMS experimental facility in English, Spanish, and Italian.

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## Selected presentations

### Major international conferences

- 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 PASCOS17 Particle physics, String theory and COSmology, Madrid. Title: Searches for extended Higgs sectors with the CMS experiment.
- 05/2016 Pittsburgh, Pheno2016: Phenomenology 2016 Symposium. Title: Extended Higgs searches at the CMS experiment.
- 09/2013 14th ICATPP Conference on Astroparticle, Particle, Space Physics and Detectors for Physics Applications; Evolution of the response of the CMS ECAL, and upgrade design options for electromagnetic calorimetry at the HL-LHC.

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

#### Seminars, workshops, and national conferences

- 05/2017 College Station, Texas. Mitchell Workshop on Collider and Dark Matter Physics. Title: Hidden sectors at colliders.
- 02/2017 Santa Fe Jets and Heavy Flavor 2017, Los Alamos National Laboratory. Title: CMS measurements of the Higgs, Higgs properties, and BSM searches.
- 02/2017 Seminar; College Station, Texas. Heavy Energy Physics Experiment and Cosmology Seminars. Title: Resonant Di-Higgs Production: Probing the Electroweak Phase Transition at the LHC.
- 10/2016 Seminar; University of Massachusetts Amherst. Title: Resonant Di-Higgs Production in the  $bbWW$  Channel: Probing the Electroweak Phase Transition at the LHC.
- 07/2016 Flash Presentation; College Station, Texas, TAMU Postdoctoral Research Symposium. Title: Extending The Higgs sector (winning talk).
- 05/2016 College Station, Texas, Mitchell Workshop on Collider and Dark Matter Physics. Title: Search for Beyond Standard Model Higgs with the CMS experiment.
- 04/2015 Seminar; College Station, Texas. Title: Measurement of the Z boson pair-production cross section in proton-proton collisions at 7 and 8 TeV, and ECAL timing studies for the phase-2 upgrade of the CMS experiment.
- 05/2013 Belgian physics Society (BPS). Title: ZZ cross section measurement at CMS experiment and aTGC limits.
- 05/2013 Annual meeting of particles AND astrophysics (PANDA). Title: ZZ cross section measurement at CMS experiment and aTGC limits.

#### Posters

- 03/2015 Poster; LHCC poster session, CERN. Title: Simulation studies on precise timing information during High Luminosity LHC.
- 06/2014 Poster: Large Hadron Collider Physics (LHCP) Conference. Title: ZZ cross-section measurement and limits on anomalous neutral triple gauge couplings at the CMS detector.
- 09/2013 Poster; LHCC poster session, CERN. Title: ZZ cross-section measurement and limits on anomalous neutral triple gauge couplings.

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## 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 (main author)

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

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CMS Collaboration, “*Track-Based Alignment of the CMS Muon System.*”, paper in preparation.

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, “*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)

#### Refereed journal publication (major contribution)

CMS Collaboration, “ *$h$  to  $aa$  to  $2\mu 2\tau$  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)

#### Public analysis, Conference Reports, and CMS internal notes

Pernié L., “*Performance of the Track-Based Muon alignment algorithm*”, CMS DP 2017-046

Castaneda A., Pernié L. et al., “*A Search for BSM Light Bosons Decaying into Muon Pairs*”, CMS PAS HIG-16-035

Castaneda A., Pernié L. et al., “*A Search for Beyond Standard Model Light Bosons Decaying into Muon Pairs*”, CMS AN 2016-044

Pernié L., “*Performance of Track-based Muon Alignment*”, CMS DP 2016-053

Pernié L., “*Simulation studies on precise timing information during High Luminosity LHC*”, CMS CR 2015-101

Pernié L., “*Measurement of the  $ZZ$  production cross section in the  $2l2\nu$  decay channel and limits on anomalous triple gauge couplings*”, CMS CR 2014-181

Fast ECAL Timing Group, “*Performance of jets and missing transverse energy with fast ECAL timing*”, CMS AN 2014-088

Meridiani P., Pernié L. Del Re D., “*Studies on a precision timing electromagnetic calorimeter for the CMS upgrade*”, CMS DN 2014-006

Pernié L., “ *$ZZ$  cross section measurements and limits on anomalous coupling constants for neutral*

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*triple gauge boson*", CMS CR 013-453

Benedetti D. et al., "*Bounding the Higgs width using Z to ll events with high missing transverse energy*", CMS AN 2013-411

Pernié L., "*CMS ECAL calibration with  $\pi^0$  and  $\eta$  in the LHC RUN1*", CMS AN 2013-344

Apyan A., Pernié L. et al., "*Search for  $Z(\rightarrow ll) H(\rightarrow \text{invisible})$  at  $\sqrt{s} = 7$  and 8 TeV*", CMS AN 2013-333

Pernié L., "*Evolution of the response of the CMS ECAL, and upgrade design options for electromagnetic calorimetry at the HL-LHC*", CMS CR 2013-284

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*", CMS PAS SMP-12-016

Benedetti D., Pernié L. et al., "*Search for a high-mass Higgs boson in the  $H \rightarrow ZZ \rightarrow 2l2\nu$  decay channel in pp collisions with the CMS detector*", CMS AN 2012-371

Benedetti D., Pernié L. et al., "*Measurement of ZZ production cross section at 7 and 8 TeV and anomalous gauge couplings limits in  $2l2\nu$  decay channel*", CMS AN 2012-148

Barberis E., Pernié L. et al., "*Search for the Higgs boson in the  $H \rightarrow ZZ \rightarrow 2l2\nu$  decay channel in pp collisions with the CMS detector*", CMS AN 2012-138

Barberis E., Pernié L. et al., "*Search for Invisible Higgs Decays in the  $ZH \rightarrow ll + \text{MET}$  channel*", CMS AN 2012-123

Pernié L., Del Re D., Organtini G., "*Search for a Standard Model Higgs boson in the decay channel  $H \rightarrow WW \rightarrow lvjj$* ", CMS AN 2012-004

Andrews W., Pernié L. et al., "*Search for Higgs Boson Decays to two W Bosons in the Fully Leptonic Final State with Full 2011 pp Dataset at  $\sqrt{s} = 7$  TeV*", CMS AN 2011-432

Akchurin N., Pernié L. et al., "*Search for a Standard Model Higgs boson produced via vector boson fusion, in the decay channel  $H \rightarrow WW \rightarrow lvjj$* ", CMS AN 2011-110