

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.

Awards

- 01/2018 CMS Achievement Awards: outstanding contribution to the MUON project. 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)

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.

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.

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

☎ +19792640374 • ✉ luca.pernie@cern.ch • 📄 [lpernie.github.io](https://github.com/lpernie)

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.

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.

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

☎ +19792640374 • ✉ luca.pernie@cern.ch • 📄 [lpernie.github.io](https://github.com/lpernie)

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), DOI:10.1103/PhysRevD.96.035007

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), DOI:10.1140/epjc/s10052-015-3706-0

Brianza L., Pernié L. et al., “*Response of microchannel plates to single particles and to electromagnetic showers*, NIMA vol. 797 (2015), DOI:10.1016/j.nima.2015.06.057

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 supersymmetry in events with at least three electrons or muons, jets, and missing transverse momentum in proton-proton collisions at $\sqrt{s} = 13$ TeV*”, analysis review committee, J. High Energy. Phys. (2018) 2018: 67, DOI:10.1007/JHEP02(2018)067

ATLAS Collaboration, “*Search for dark matter produced in association with a Higgs boson decaying to bb using 36 fb^{-1} of pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector*”, External referee, Phys. Rev. Lett. 119, 181804, DOI:10.1103/PhysRevLett.119.181804

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), DOI:10.1007/JHEP10(2015)144

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), DOI:10.1140/epjc/s10052-013-2469-8

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

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

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

Pernié L., *"ZZ cross section measurements and limits on anomalous coupling constants for neutral 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 π^0 and η 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