

Cristian Xavier Baldenegro Barrera, Ph.D.

Current position Postdoctoral position with the European Research Council (ERC) Nov 2021 – Present consolidator grant “*QCDHighDensityCMS*”, based at Laboratoire Leprince-Ringuet (LLR) at Ecole Polytechnique in Paris, France.

Education *Ph.D. in Physics* 2016 – Aug 2021
The University of Kansas (KU), Lawrence, Kansas, U.S.
Thesis title: “*Strongly interacting color-singlet exchange and photon exchange in highenergy proton-proton collisions*” ([link to thesis manuscript](#) and [link to thesis presentation](#)) Supervisor: Christophe Royon

Licenciatura en Física (B. Sc. in Physics) 2011 – 2015
Universidad de Sonora, Hermosillo, Sonora, Mexico

Research I am interested in helping understand the emergent properties of the strong nuclear force **interests** at short distances, described by quantum chromodynamics (QCD). For this, I study jet production in high energy proton-proton and nucleus-nucleus collisions with the CMS experiment at the LHC.

In parallel, I am in contact with theorists and phenomenologists in order to identify concrete physical observables/processes to get new insights on the strong force or to improve our chances of finding new physics. For the latter, I have worked on processes with quasireal photon exchanges from protons/lead nuclei.

Keywords QCD, jets, jet substructure, jet quenching, small-x, ultraperipheral collisions, diffraction, BSM searches in two-photon fusion

Research **Research during postdoctorate at Ecole Polytechnique** Nov 2021–Present **experience**
CMS experiment at the LHC

Primary author of the measurement of the primary Lund jet plane density in $s = 13$ TeV proton-proton collisions in CMS (**SMP-22-007**, analysis note **AN-22-001**). Contributing to jet substructure analyses in PbPb collisions (photon-tagged jets **HIN-23-001**, heavy-flavor jet substructure).

Collaborators with ERC project: Leticia Cunqueiro (PI), Matthew Nguyen, Bharadwaj Harikrishnan, Lida Kalipoliti

Research during the Ph.D. at the University of Kansas Aug 2016– Aug 2021 **CMS and**

TOTEM experiments at the LHC

I was the official contact person and primary author of the CMS and CMS-TOTEM analysis SMP-19-006 ([arXiv:2102.06945](#) *Phys. Rev. D* 104, 032009 (2021)) on hard color-

singlet exchange dijet events. I analyzed 13 TeV events where the two leading jets are separated by a rapidity interval without energy flow. The process is used to test predictions based on the Balitsky–Fadin–Kuraev–Lipatov evolution equations of pQCD. I also did the first measurement where, in addition, one of the proton interacts diffractively and remains intact (CMS-TOTEM measurement).

As the contact person, I extracted all the results of the analysis (internal note AN-18-174), and was responsible for the analysis throughout the CMS internal review.

Particle physics phenomenology

I have collaborated with phenomenologists to address the sensitivity to physics beyond the standard model at the LHC in two-photon exchange processes in pp, pA, and AA collisions. The work has resulted in direct implementations in the Forward Physics Monte Carlo (FPMC) event generator and four publications in peer-reviewed journals.

Undergraduate research experience

Expected constraints on free parameters of Λ CDM with photometric red galaxy data, University of Arizona, Tucson, Arizona, U.S. Summer of 2015

Short-baseline neutrino oscillation and neutrinoless double-beta decay, Oak Ridge National Laboratory in Oak Ridge, Tennessee, U.S. and Sanford Underground Research Facility in Lead, South Dakota, U.S. Summer of 2014

Thermodynamical properties of a fluid made of sphere-cylindrical particles, Universidad de Guanajuato, Leon, M^éxico Summer of 2013

Awards,

- 2023 American Physical Society Tanaka Dissertation Award **distinctions**

- 2021 Academic Achievement Award of the State of Sonora in Mexico (Premio Estatal de la Juventud Sonorense, Logro Academico)
- 2016 & 2019 Brazil-U.S. Physics Ph.D. Student and Postdoc Visitation Program sponsored by the American Physical Society.
- Recipient of the 2014 Verano Nuclear Award, obtained in a national competition organized by the Mexican Physical Society (SMF). Award used to fund internship at Oak Ridge National Laboratory.

Publications

Few-authored peer-reviewed publications of which I was main author or co-author

1. **Groomed jet radius and jet girth in PbPb and pp collisions at 5.02 TeV** (2023), CMS Collaboration, CMS-PAS-HIN-23-001 (co-author).
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2. **Measurement of the primary Lund jet plane density in proton-proton collisions at 13 TeV** (2023), CMS Collaboration, [CMS-PAS-SMP-22-007](#) (contact person & main author).

Respective CMS physics briefing “[A fractal tree of quarks and gluons](#)”

3. **Jets separated by a large pseudorapidity gap at the Tevatron and at the LHC**, C. Baldenegro, P. Gonzalez, M. Klasen, J. Salomon, C. Royon [arXiv:2206.04965](#), *JHEP* 08 (2022) 250.
4. **Searching for anomalous top quark interactions with proton tagging and timing detectors at the LHC**, C. Baldenegro, A. Bellora, S. Fichet, G. von Gersdorff, M. Pitt, C. Royon, [arXiv:2205.01173](#), *JHEP* 08 (2022) 021.
5. **Scaling properties of elastic proton-proton scattering at LHC energies**, C. Baldenegro, C. Royon, A. Stasto, [arXiv:2204.08328](#), *Phys. Lett. B* 830 (2022) 137141.
6. **Hard color-singlet exchange in dijet events in proton-proton collisions at $\sqrt{s} = 13$ TeV**, CMS and TOTEM Collaborations, CMS-SMP-19-006, TOTEM-2021001, CERN-EP-2020-229, [arXiv:2102.06945](#), *Phys. Rev. D* 104 (2021) 032009, (contact person & main author).
7. **Central exclusive production of W boson pairs with pp collisions at the LHC**, C. Baldenegro, G. Biagi, G. Legras, C. Royon, *JHEP* 12 (2020) 165,

[doi.org/10.1007/JHEP12\(2020\)165](https://doi.org/10.1007/JHEP12(2020)165), [arXiv:2009.08331](#).
8. **Extending the constraint for axion-like particles as resonances at the LHC and laser beam experiments**, C. Baldenegro, S. Hassani, L. Schoeffel, C. Royon,

Phys. Lett. B 795 (2019) 339, doi.org/10.1016/j.physletb.2019.06.029,
[arXiv:1903.04151](#)
9. **Searching for axion-like particles with proton tagging at the LHC**, C. Baldenegro,

S. Fichet, G. von Gersdorff, C. Royon, *JHEP* 06 (2018) 131,
[doi:10.1007/JHEP06\(2018\)131](https://doi.org/10.1007/JHEP06(2018)131), [arXiv:1803.10835](#).
10. **Probing the anomalous $\gamma\gamma Z$ coupling at the LHC with proton tagging**, C. Baldenegro, S. Fichet, G. von Gersdorff, C. Royon, *JHEP* 1706 (2017) 142,

[doi:10.1007/JHEP06\(2017\)142](https://doi.org/10.1007/JHEP06(2017)142), [arXiv:1703.10600](#)

I have signed CMS and TOTEM collaboration papers as since 2019 and 2017, respectively (authored more than 250 collaboration papers as of April 2023, according to [InspireHEP \(click here to see\)](#)).

Papers signed as a result of my service work in 2014 at Oak Ridge National Laboratory:

The PROSPECT Reactor Antineutrino Experiment, PROSPECT Collaboration, J. Ashenfelter, A.B. Balantekin, C. Baldenegro et al., *Nucl.Instrum.Meth. A* 922 (2019) 287,

[arXiv:1808.00097](https://arxiv.org/abs/1808.00097), [doi:10.1016/j.nima.2018.12.079](https://doi.org/10.1016/j.nima.2018.12.079)

First search for short-baseline neutrino oscillations at HFIR with PROSPECT, PROSPECT Collaboration, J. Ashenfelter, A.B. Balantekin, [C. Baldenegro](#) et al., Phys.

Rev. Lett. 121, 251802 (2018), [arXiv:1806.02784](https://arxiv.org/abs/1806.02784), [doi:10.1103/PhysRevLett.121.251802](https://doi.org/10.1103/PhysRevLett.121.251802)
Background Radiation Measurements at High Power Research Reactors, PROSPECT Collaboration, J. Ashenfelter, A.B. Balantekin, [C. Baldenegro](#) et al., Nucl.Instrum.Meth.

A806: 401-419 (2016), [10.1016/j.nima.2015.10.023](https://doi.org/10.1016/j.nima.2015.10.023)

Status of the MAJORANA DEMONSTRATOR: A search for neutrinoless doublebeta decay, MAJORANA Collaboration, Yu. Efremenko, N. Abgrall, I.J. Arnquist, PNL, Richland, F.T. Avignone, [C. Baldenegro](#) et al. *Int.J.Mod.Phys.A* 30 (2015) 12, 1530032,

[doi:10.1142/S0217751X1530032X](https://doi.org/10.1142/S0217751X1530032X)

Review articles

Photon-photon physics at the LHC and laser beam experiments, present and future (2020), invited review paper, L. Schoeffel, [C. Baldenegro](#), H. Hamdaoui, S. Hassani,

C. Royon, M. Saimpert, *Progress in Particle and Nuclear Physics*, [arXiv:2010.07855](https://arxiv.org/abs/2010.07855), [10.1016/j.pnpnp.2021.103889](https://doi.org/10.1016/j.pnpnp.2021.103889).

Diffraction and photon exchange processes at the LHC and parton saturation (2020), [C. Baldenegro](#), C. Royon, *International Journal of Modern Physics A* (2020) ,

[doi:10.1142/S0217751X20300045](https://doi.org/10.1142/S0217751X20300045).

Group reports

Snowmass 2022 process:

- **Snowmass White Paper on Forward Physics, BFKL, Saturation Physics and Diffraction** (direct contribution by [C. Baldenegro](#) in section IIE and VIID), [arXiv:2203.08129](https://arxiv.org/abs/2203.08129).
- Letter of Interest (EF06), “Probing anomalous quartic gauge couplings with proton tagging at the CERN Large Hadron Collider” (**editor**) [link to pdf](#)
- Letter of Interest (EF06), “Top quark production with proton tagging at the CERN LHC” (**editor**) [link to pdf](#)
- Letter of Interest (EF06), “Probing Balitsky-Fadin-Kuraev-Lipatov dynamics in production of two jets separated by a rapidity gap” (**editor**) [link to pdf](#)

Standard Model Physics at the HL-LHC and HE-LHC (2019) WG1 report, CERNLPCC-2018-03, direct contribution by [C. Baldenegro](#) on the Forward Physics section (pp 160–163), [arXiv:1902.04070](https://arxiv.org/abs/1902.04070)

Proceedings

Hard color-singlet exchange in dijet events (2021), [C. Baldenegro](#) on behalf of the CMS Collaboration, DIS2021 Proceedings.

Jet measurements at CMS (2020), [C. Baldenegro](#) on behalf of the CMS Collaboration, ICHEP2020 Proceedings, [arXiv:2011.06697](#), PoS (ICHEP2020)451.

Recent results on diffraction and soft physics by the CMS Collaboration (2020), [C. Baldenegro](#) on behalf of the CMS Collaboration, Contribution to Proceedings of Forward Physics Workshop in Guanajuato, [arXiv:2008.05615](#)

Proceedings: Workshop on Forward Physics and QCD at the LHC, the Future Electron Ion Collider, and Cosmic Ray Physics (2020)
Editors: [C. Baldenegro](#), D. Delepine, M. Hentschinski, C. Royon, [doi:10.17161/1808.30727](#).

Recent CMS results on soft and small-x QCD physics (2018), [C. Baldenegro](#) on behalf of CMS, conference report, CMS-CR-2018-312, Proceedings of Diffraction and Low-x 2018 workshop, [doi:10.5506/APhysPolBSupp.12.879](#)

Searching for axion-like particles with proton tagging (2018), [C. Baldenegro](#), Acta Physica Polonica B, Proceedings of Diffraction and Low-x 2018 workshop, [doi:10.5506/APhysPolBSupp.12.799](#)

Probing anomalous quartic interactions at the LHC with proton tagging (2018), [C. Baldenegro](#), International Symposium on Multiparticle Dynamics 2017, EPJ Web of Conferences 172, 06002 (2018), [doi:10.1051/epjconf/201817206002](#)

PHOTON-2017 conference proceedings (2017), pp 85–92, S. Fichet and [C. Baldenegro](#), [doi: http://dx.doi.org/10.23727/CERN-Proceedings-2018-001.1](http://dx.doi.org/10.23727/CERN-Proceedings-2018-001.1)

Committees, organization

- Jet & PDF session convener at Low-x 2022 at Cosenza, Italy.
- Diffraction and small-x session convener at MPI@LHC 2023 at Manchester, UK.
- Lund jet plane workshop organization (co-chair), workshop at CERN. Jul 2023
- Co-chair of the 2021 Forward Physics & QCD meeting Jan 2021 at the EIC, LHC, and cosmic ray physics, hosted by JLab.
- Coordinator of the Graduate Colloquia series at the Dpt. Sep 2020– May 2021 of Physics & Astronomy at the University of Kansas
- Co-chair of the Forward Physics & QCD meeting Nov 2019 in Guanajuato, Mexico.
- Graduate student representative at the Physics Dpt. Aug 2019 – May 2021 Assembly of KU (position with voting rights).
- Co-organizer of the interdisciplinary seminar of 2019 KU-Sonora Summer 2019 Research Program.

Reviewing responsibilities

- Physics student representative before the Natural Sciences Division of 2014–2015 Universidad de Sonora (position with voting rights)
- Reviewer for NSF grant proposals (Nuclear Physics Program).
- Referee for JHEP and PRC.
- Member of analysis review committees (ARCs) in CMS (JME, HIN, SMP groups).
- Analysis reviewer as Level-3 convener in CMS (forward physics, small-x, ultraperipheral collisions).

Convenership & contact roles

- Convener of the Forward physics group of the heavy ion (HIN) Sep 2022 – Sep 2024 group of CMS (Level-3 in CMS).
- Proton object contact for the standard model physics (SMP) Sep 2019 – Present group of CMS.

Conference talks

- “Jet substructure using iterative declustering in CMS”, **BOOST 2023** Aug 2023
[link to slides](#)
- “Jet substructure and fragmentation”, **SM@LHC 2023** July 2023
[link to slides](#)
- “Jet substructure using the Lund tree in 13 TeV pp collisions”, talk at Lund jet plane workshop at CERN TH, [link to slides](#) July 2023
- “Jet showers in the Lund plane”, QGP France, Bagnoles-de-l’Orne, France June 2023

“Jet substructure in heavy ions”, physics plenary talk at CMS Week at Saint-Malo, France , link to slides	Apr 2023
“Heavy-ion physics at CMS and ATLAS”, MoriondQCD at La Thuile, Italy link to slides	Mar 2023
“Measurements of forward and diffractive physics by CMS and CMS-TOTEM”, 2023 Epiphany Conference , Cracow, Poland. link to slides	Jan 2023
“Measurements of jet substructure observables in ATLAS and CMS experiments”, QCD@LHC 2022, Orsay, Paris. link to slides	Nov 2022
“Jets separated by a large pseudorapidity gap at the Tevatron and at the LHC”, XIII Multiple Parton Interactions Madrid, Spain link to slides	Nov 2022
“Summary of HIN Workshop and data-taking preparation,” physics plenary talk at CMS Week link to slides (CMS internal).	Sep 2022
“Diffractive and exclusive processes in heavy ion collisions with CMS”, ICHEP 2022 , Bologna, Italy link to slides	July 2022
“Measurements of jet substructure with the CMS detector 2022 Deep Inelastic Scattering , Santiago de Compostela link to slides	May 2022
“Diffractive results from CMS and TOTEM experiments”, on behalf of the CMS-TOTEM Collaborations, Low-x 2021 workshop, Isola d’Elba, Italy. link to slides	Sep 2021
“Phenomenology of Mueller–Navelet and Mueller–Tang jets”, Low-x 2021 workshop, Isola d’Elba, Italy. link to slides	Sep 2021
“Small-x physics at the LHC and at the EIC”, workshop on high-energy physics at Universidad de Sonora. link to slides	Aug 2021
“Mueller–Navelet jets and jet-gap-jet measurements at the CMS and TOTEM experiments” at workshop on Saturation and Diffraction Physics hosted by ECT*, Trento, Italy. link to slides	Jul 2021
“Hard color-singlet exchange,” parallel talk on behalf of CMS at the 2021 Deep Inelastic Scattering conference hosted by Brookhaven National Lab and Stony Brook University. link to slides	Apr 2021
“Measurements of events with jet-gap-jet topology by CMS and TOTEM” LHC Forward Physics meeting, CERN. link to slides	Mar 2021
“Exclusive <i>WW</i> production in hadronic and semi-leptonic channels at the LHC” LHC Forward Physics meeting, CERN. link to slides	Mar 2021
“Photon exchange,” plenary talk at the 2021 Workshop of Forward Physics and QCD at the EIC, the LHC, and Cosmic Ray Physics hosted by JLab. Also co-organizer of the event. link to slides	Jan 2021

<p>“Study of hard color-singlet exchange in dijet production in pp collisions at $\sqrt{s}=13$ TeV,” plenary talk at the 2020 Zimanyi Winter School Workshop’ link to slides</p>	Dec 2020
<p>“Study of hard color-singlet exchange in dijet production in pp collisions at $\sqrt{s}=13$ TeV,” parallel talk at the APS Division of Nuclear Physics meeting link to abstract</p>	Oct 2020
<p>“Jet measurements at CMS,” talk presented on behalf of CMS at ICHEP2020 link to slides link to YouTube video</p>	Jul 2020
<p>“Study of hard color singlet exchange in dijet events with pp collisions at 13 TeV,” Physics plenary talk during CMS Week link to internal collaboration slides</p>	Apr 2020
<p>“Review results on forward physics by CMS,” plenary talk on behalf of the CMS Collaboration presented at the Workshop of Forward Physics & QCD at the LHC, the future EIC and Cosmic Ray Experiment held in Guanajuato, Mexico. link to slides</p>	Nov 2019
<p>“Soft and forward physics results by CMS,” plenary talk on behalf of the CMS Collaboration at the Low-x 2019 workshop at Nicosia, Cyprus. link to slides</p>	Aug 2019
<p>“Measurements of event properties and correlations in multi jet events in CMS,” plenary talk on behalf of the CMS Collaboration at the Low-x 2019 workshop at Nicosia, Cyprus. link to slides</p>	Aug 2019
<p>“Searching for axion-like particles in light-by-light scattering at the LHC,” plenary talk at the Low-x 2019 workshop at Nicosia, Cyprus. link to slides</p>	Aug 2019
Working group, national mtgs. talks	
<p>“Searching for axion-like particles with proton tagging at the LHC,” plenary talk presented at the Reunion Anual de la Divisi´ on de Part´ ıculas y Campos de la Sociedad Mexicana de Fısica, Puebla, Mexico. link to slides</p>	May 2019
<p>“Measurements of multijet and photon+jet processes with CMS,” parallel talk on behalf of the CMS Collaboration at LHCP2019, Puebla, Mexico.’ link to slides</p>	May 2019
<p>“Forward physics with proton tagging at the LHC,” APS April Meeting Denver, CO (on behalf of Christophe Royon). link to slides</p>	Apr 2019
<p>“Searching for axion-like particles with proton tagging at the LHC,” APS April Meeting, Denver, CO. link to slides</p>	Apr 2019

<p>“Recent results on minimum-bias, underlying event and small-x physics by CMS,” plenary talk on behalf of the CMS Collaboration at the 2018 Diffraction and Low-x workshop, Reggio Calabria, Italy. link to slides</p>	<p>Aug 2018</p>
<p>“Searching for axion-like particles with proton tagging at the LHC,” plenary talk presented at the 2018 Diffraction and Low-x workshop, Reggio Calabria, Italy. link to slides</p>	<p>Aug 2018</p>
<p>“Searches for New Physics in Photon Collisions at the LHC,” Kansas Academy of Sciences 150th Meeting in Topeka, KS. page 6 in PDF linked here, Best talk award</p>	<p>Apr 2018</p>
<p>“Searches for new physics in mono-photon channel with CMS at $s=13$ TeV” analysis team presentation at the CMS Data Analysis School 2018 at Fermilab. link to slides</p>	<p>Jan 2018</p>
<p>“Search for anomalous quartic gauge interactions at the LHC using proton tagging,” talk presented at the Particles in the Fields workshop, Lawrence, Kansas, U.S. link to slides</p>	<p>Oct 2017</p>
<p>“Search for anomalous quartic gauge interactions at the LHC using proton tagging,” plenary talk presented at the 2017 International Symposium of Multiparticle Dynamics, Tlaxcala, Mexico. link to slides</p>	<p>Sep 2017</p>
<p>“Search for anomalous quartic gauge interactions at the LHC using proton tagging,” parallel talk at the Canadian-American-Mexican Graduate Student Physics Conference 2017 in Washington, D.C., U.S. link to program</p>	<p>Aug 2017</p>
<p>“Probing anomalous quartic $\gamma\gamma Z$ coupling at the LHC,” plenary talk at the 2017 Low-x workshop, Bisceglie, Italy. link to slides</p>	<p>Jun 2017</p>
<p>“Constraining dark energy using photometric supernovae surveys,” parallel talk at the Latin American Summer Research Program, University of Arizona.</p>	<p>Jul 2015</p>
<p>“PROSPECT: A short-baseline reactor anti-neutrino oscillation and Spectrum Experiment,” plenary talk at the Exotic Beam Summer School in Oak Ridge National Laboratory. (link to abstract here)</p>	<p>Jul 2014</p>
<p>“Overview of Lund plane density measurement”, SMP-HAD Workshop, CERN link to internal slides.</p>	<p>Jan 2023</p>
<p>“Scaling properties of pp elastic scattering at LHC energies,” at the LHC Forward Physics Working Group meeting link to slides.</p>	<p>Sep 2022</p>
<p>“Jet substructure in the Lund plane,” presentation at the 1st HIN Workshop link to slides (CMS internal).</p>	<p>Aug 2022</p>
<p>“Hard color-singlet exchange in dijet events at 13 TeV,” presentation at Forward physics meeting at KU link to slides.</p>	<p>May 2022</p>
<p>“Measurement of the Lund jet plane density at 13 TeV with CMS,” presentation at QCD GDR Assemblee Generale 2022 link to slides.</p>	<p>May 2022</p>

“Measurement of the Lund jet plane density at 13 TeV,” presentation at Recontres QGP France 2022 link to slides .	May 2022
“Measurement of the Lund jet plane density at 13 TeV,” presentation at SMP-HAD workshop 2022. link to slides (internal)	Feb 2022
“Measurement of the jet-gap-jet topology with CMS and TOTEM” LHC Forward Physics Working Group meeting link to slides in agenda	March 2021
“Central exclusive W^+W^- in hadronic and semi-leptonic channels” LHC Forward Physics Working Group meeting link to slides in agenda	March 2021
“High energy limit of QCD and photon exchange processes,” talk presented at the Snowmass EF06 Early Career Researcher’s meeting (co-organizer of the meeting as EF06 Early Career liaison) link to agenda	Oct 2020
“Anomalous coupling studies with proton tagging,” talk presented at the Snowmass-EF06 working group meeting	Jul 2020
“Exclusive electroweak processes,” talk presented at the 2021 Snowmass Process joint session on “Open questions and new ideas” link to video , link to slides	Jul 2020
“Jets separated by a rapidity gap” review talk presented at the Snowmass EF06 working group meeting for the 2021 Snowmass Process, link to slides	Jun 2020
“Update on jet-gap-jet and future forward physics measurements with CMS” CMS SMP-HAD Workshop link to slides (internal)	Feb 2020
“Anomalous quartic gauge couplings and searches for axion-like particles with proton tagging,” plenary talk at the LHC Forward Physics Working Group Meeting. link to slides	Dec 2018
“Probing anomalous quartic $\gamma\gamma Z$ coupling at the LHC,” plenary Jun 2017 talk at the TOTEM Collaboration meeting in Malaucene, France. link to slides	
“Forward Physics Monte Carlo status update,” plenary talk at the TOTEM Collaboration meeting in Malaucene, France. link to slides	Jun 2017
“Jet-gap-jet events at 13 TeV in CMS and TOTEM,” plenary talk at TOTEM Collaboration meeting in Malaucene, France. link to slides	Jun 2017
“Status of FPMC,” talk at the Forward Physics Working Group Meeting at CERN. link to slides	Mar 2017
“Probing anomalous quartic $\gamma\gamma Z$ coupling at the LHC,” talk at the Forward Physics Working Group Meeting at CERN. link to slides	Mar 2017
“Jet-gap-jet in diffraction,” plenary talk at the Forward Physics Working Group Meeting in Trento, Italy. link to slides	Sep 2016

Seminars

- “The Lund jet plane”, CERN-TH collider cross talk seminar with Gregory Soyez, [link to abstract](#) June 2023
- “Strong interactions in the high energy limit,” Laboratoire Leprince-Ringuet at Ecole Polytechnique. Dec 2021
- “Strong interactions in the high energy limit,” Physics and Astronomy Graduate Colloquium at the University of Kansas. March 2021
- “Strong interactions in the high energy limit,” invited seminar at the Centro de Investigacion y Estudios Avanzados (CINVESTAV) in Mexico City. Dec 2020
- “Hard diffraction and photon-exchange processes at the Tevatron and at the LHC,” seminar talk at Universidade Federal do Rio de Janeiro in Brazil. Oct 2019
- “Probing parton saturation in inclusive jet production in proton-lead collisions at the Large Hadron Collider,” nuclear physics seminar at the University of Kansas. Mar 2019

Posters

- “Fractal showers in the Lund plane”, presented at CMS Week in Saint-Malo, France [link to poster](#) **CMS Week poster award** Apr 2023
- “Hard color-singlet exchange in dijet events at $s=13$ TeV with CMS and TOTEM,” poster presented at the LHCC poster session. [link to poster](#) Nov 2021
- “Study of the hard color-singlet exchange in dijet events in pp collisions at $s=13$ TeV,” poster on behalf of the CMS Collaboration at the Reunion Anual de la Division de Partículas y Campos de la Sociedad Mexicana de Física in Puebla, Mexico. May 2019
- “Searching for axion-like particles with proton tagging at the LHC,” poster 2019 presented at the LHCP 2019 in Puebla, Mexico. [link to slides](#) May 2019
- “Recent PPS results and prospects,” poster presented on behalf of the CMS and TOTEM Collaborations, LHCP 2019 in Puebla, Mexico. May 2019
- “Results from the CMS-TOTEM Precision Proton Spectrometer (PPS)” poster presented on behalf of the CMS and TOTEM Collaborations at the 2019 APS April Meeting. [link to abstract](#) Apr 2019
- “Probing the hard color-singlet exchange at 13 TeV with CMS,” poster presentation at the European High Energy School of Particle Physics 2018, Maratea, Italy. [page 296 in this file](#) Jul 2018
- “Constraining Dark Energy with Photometric Supernovae Surveys,” poster presentation at the University of Arizona’s Latin American Summer Research Program poster session. Jul 2015
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Student co-supervision & mentorship

- J. March (intern at LLR from Grinnell College, secondary Lund jet planes)
- L. Kalipoliti (Ph.D. student at LLR, heavy-flavor jet substructure)
- B. Harikrishnan (Ph.D. student at LLR, photon-tagged jet substructure)
- L. Tarbouriech (intern at LLR from Ecole Normale Supérieure, inclusive b-jet cross sections in PbPb and pp).
- M. Kampshoff (M.Sc. student at Münster University at, Mueller-Navelet jets phenomenology)
- P. Gonzalez (M.Sc. student at Münster University at, jet-gap-jet phenomenology)
- C. LeMahieu (Ph.D. student at KU, luminosity calibration with $\gamma\gamma \rightarrow \mu^+\mu^-$ events).
- W. Doumerg (intern at KU from Ecole Normale Supérieure, implementation of $\gamma\gamma \rightarrow ZZ$ SM process in MC)
- G. Legras (intern at KU from Ecole Centrale de Paris, $\gamma\gamma \rightarrow W^+W^-$ phenomenology)
- M. Massa (intern at KU from Ecole de Mines de Paris, $\gamma\gamma \rightarrow W^+W^-$ phenomenology)
- Z. Warner (M.Sc. student at KU, NLO dijet cross section calculations)
- G. Biagi (intern at KU from Ecole Centrale de Paris, $\gamma\gamma \rightarrow W^+W^-$ phenomenology)

Languages

Spanish (native), English (fluent)