

Georgios Konstantinos **Krintiras**

PHD · EXPERIMENTAL ELEMENTARY PARTICLE AND NUCLEAR PHYSICS

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Summary

My **ability to plan, conduct, and manage a diversity of projects and people** can be assessed through my work as research associate, currently at the University of Kansas, for one the biggest experimental Collaborations to date (**CMS**) that records big data at the European Organization for Nuclear Research (CERN). My discoveries and measurements in the areas of **High-Energy Nuclear and Particle Physics** and **Physics Instrumentation and Detectors** had unveiled the unique reach of the physics program at the Large Hadron Collider and the multitude of, yet unforeseen, capabilities of the CMS experiment. I am very glad that Editors of prestigious journals **highlighted my research**, e.g., Refs. [1, 2] (interestingly, the Physics Department Head at MIT classified it in the “never thought I’d see it category” [3]) while I recently represented the CMS Collaboration at the **CERN press release** [4], later featured in other institutes around the world, e.g., Ref. [5] or high-traffic sites, e.g., Ref. [6]. It is my honor that CMS **awarded me** the prize for seminal luminosity calibration work, nominated my research [7] for the **best thesis award**, and officially recognized my leading expertise at LHC through **high-level managerial positions** [8, 9]. During this multiyear effort, I had the chance to **conduct research** in HIN, HIG, and TOP (EGM, JME, and LUM) physics (calibration) groups, respectively, and **promote the outcome** in major international conferences on behalf of CMS. I **co-authored and peer-reviewed** a number of research papers and articles in **prestigious journals**.

Groups that are interested in hiring me can **greatly benefit** from close collaboration with many teams around the world either remotely (by definition a fundamental part of our job within international collaborations) or in person (for my case, already counting five countries and eight institutes in total). Based on my in-depth analysis, also including detector operating and physics-object calibration activities, and managerial knowledge, we can **seed and lead efforts** in designing, executing, documenting, and convening physics analyses and groups within CMS. In parallel, synergies in the field of **heavy ion phenomenology** and engagement to existing projects for **future colliders** are foreseen, as I documented in a series of corresponding research papers.

Education

All levels were scholarship-funded:

Université Catholique de Louvain (UCLouvain), Belgium

PHD IN EXPERIMENTAL ELEMENTARY PARTICLE AND NUCLEAR PHYSICS

2015–2019

The University of Amsterdam (UvA), The Netherlands

MSC IN EXPERIMENTAL ASTROPARTICLE AND ELEMENTARY PARTICLE PHYSICS (*cum laude*)

2013–2015

Lund University, Sweden

BS IN EXPERIMENTAL NUCLEAR PHYSICS (*honors*)

2012

Aristotle University of Thessaloniki (AUTH), Greece

BS IN PHYSICS

2008–2012

Research

Expert experience in High-Energy **Nuclear** (standard (NN) and ultraperipheral (UPC) nucleus-nucleus collisions) and **Particle Physics** (proton-proton (pp) and recently muon-muon ($\mu^+\mu^-$) collisions), and in **Physics Instrumentation and Detectors**:

Fermilab, US

GUEST RESEARCH ASSOCIATE (CMS COLLABORATION)

Mar 2020

- Performance optimization of low- p_T electrons (UPC)

The University of Kansas, US/CERN, Switzerland

RESEARCH ASSOCIATE (CMS COLLABORATION)

Jan 2019–Present

- Deep machine learning (NN)
- In-medium parton energy loss (NN)
- Luminosity detector engineering design
- Luminosity calibration (pp, pN, NN, UPC, and $\mu^+\mu^-$)
- Monte Carlo event generation (NN and UPC)
- Parton distribution functions (NN)
- Physics object—electron and heavy flavor hadron—calibration (NN)
- Searches for beyond the standard model (UPC)
- W/Z boson and top quark production (pN and NN)
- τ lepton $g - 2$ (UPC)

Centre for Cosmology, Particle Physics and Phenomenology, Belgium/CERN, Switzerland

RESEARCH ASSISTANT (CMS COLLABORATION)

Jan 2015–Jan 2019

- Luminosity calibration and detector operation (pp and pN)
- Monte Carlo event generation (pp and pN)
- Parton distribution functions (pp and pN)
- Physics object—electron, missing p_T , and muon—calibration (pp and pN)
- Pileup mitigation techniques (pp)
- Top quark associated production with the standard model Higgs boson (pp)
- Top quark production (pp and pN)

Dutch National Institute for Subatomic Physics (NIKHEF), The Netherlands/ Lund University, Sweden/CERN, Switzerland

RESEARCH ASSISTANT (ALICE COLLABORATION)

Jan 2012–June 2012, Jan 2014–Jan 2015

- Machine learning (NN)
- Transverse anisotropic flow of identified particles (NN)
- Performance optimization of low- p_T hyperons (NN)

Honors & Awards

FUNDING

2021	National Science Foundation , EPSCoR Research Infrastructure Improvement Track 4 (Nominated)	<i>Jetscape (<\$100K)</i>
2020	LHC Physics Center , LPC Guest and Visitor Program	<i>CMS (<\$10K)</i>
2019– Present	US Department of Energy , DE-FG02-96ER40981 (Extension of DE-SC0019389 (PI C. Royon))	<i>CMS (>\$100K)</i>

OTHER (INCLUDING FINANCIAL SUPPORT)

2022	CMS Collaboration , CMS Award Outstanding Contribution to Precision Luminosity Calibration Effort	
2022	The University of Kansas , Research Staff Achievement Award	<i>Nominated</i>
2022	Snowmass22 Community Summer Study , Travel Award	
2020	CMS Collaboration , Best Thesis Award	<i>Nominated</i>
2015–2016	French Community of Belgium , Fonds Spéciaux de Recherche	
2014	CERN , Summer Student Program	
2013–2015	Greek State Scholarships Foundation (IKY) , MSc Scholarship	
2012	European Commission , Erasmus grants for Higher Education	

Convernsorships and contact roles

L2 Coordinator

HIN PAG

CMS

2022–2024

L2 Coordinator

LUM POG

CMS

2019–2021

L3 Coordinator

FBCM ENGINEERING DESIGN WORKING GROUP (BRIL)

CMS

2022–Present

L3 Coordinator

FORWARD PHYSICS GROUP (HIN PAG)

CMS

2021–2022

L3 Coordinator

SINGLE TOP, TOP MASS AND PROPERTIES GROUPS (TOP PAG)

CMS

Nominated 2021–2022

Coordinator of nuclear-PDFs-related studies

7TH ENERGY FRONTIER (EF) TOPICAL GROUP

Snowmass22

2020–2022

Contact for analysis preservation tools (RIVET)

TOP PAG

CMS

2020–Present

Active projects

My site provides the full list of [projects](#), along with a brief description.

Axion-like particle searches with the ATLAS and CMS experiments

ATLAS, CMS

UPC, [LETTER OF INTEREST](#)

- First-ever combination of light-by-light scattering cross-section measurements at LHC

Deep machine learning in the identification of heavy-flavor jets from top quark decays

CMS

NN, [POPULAR SCIENCE SUMMARY](#)

- Identification of jets developing the CMS default “DeepCSV” algorithm

Development of the luminosity measurement instrumentation from Run 2 to Phase-2

CMS

[TECHNICAL DESIGN REPORT](#)

- Engineering design for an independent triggerless luminometer, the Fast Beam Conditions Monitor (FBCM), for the Phase-2 BRIL upgrade

Luminosity calibration

CMS, Muon Collider Community

PP, PN, NN, AND $\mu^+\mu^-$, [POPULAR SCIENCE SUMMARY](#), [LETTER OF INTEREST](#)

- Legacy luminosity measurements in CMS and studies of methods in a future muon collider

Measuring τ lepton $g - 2$ using LHC heavy ion collisions

CMS, Snowmass22

UPC, [LETTER OF INTEREST](#)

- Surpassing the 15 year old lepton collider precision on $g_{\tau} - 2$ via the first experimental observation of τ lepton in nuclear collisions

Resolving the time dimension in jet quenching studies of the QGP at LHC and HL-LHC

CMS, Jetscape, Snowmass22

NN, [POPULAR SCIENCE SUMMARY](#), [LETTER OF INTEREST](#)

- Studies of jet modifications while passing through the quark-gluon plasma (QGP)

Publications and peer-reviewing

Publications are provided separately and [summarized](#) in my site too.

I am peer-reviewing submissions to the Journal of High Energy Physics (JHEP)

Oral presentations and invited seminars (last 10)

My site provides the full list of [oral](#) and [poster](#) presentations, including conference proceedings, and [seminars](#).

CMS results in photon physics

Kraków

NEW VISTAS IN PHOTON PHYSICS IN HEAVY-ION COLLISIONS

Sep 2022

First measurement of the $\gamma\gamma \rightarrow \tau^+\tau^-$ production in PbPb collisions with the CMS experiment

Santiago de Compostela, Busan

XXIX INTERNATIONAL WORKSHOP ON DEEP-INELASTIC SCATTERING AND RELATED SUBJECTS, 21st STRANGENESS IN QUARK

MATTER 2022

May, June 2022

Quark-Gluon Plasma properties

Taiwan

10TH ANNUAL LARGE HADRON COLLIDER PHYSICS CONFERENCE

May 2022

Light-by-light scattering cross-section measurements at LHC

Kraków

XXIXTH INTERNATIONAL CONFERENCE ON ULTRARELATIVISTIC NUCLEUS-NUCLEUS COLLISIONS

Apr 2022

CMS: perspective, wishes, proposals, and views on the working group

CERN

KICKOFF MEETING OF THE LPCC WORKING GROUP ON HEAVY-IONS

July 2021

Heavy flavor collectivity in small systems at LHC

Paris

9TH EDITION OF THE LARGE HADRON COLLIDER PHYSICS CONFERENCE

June 2021

Flow harmonics in heavy ion physics at CMS and ATLAS

La Thuile

RENCONTRES DE MORIOND 2021: QCD AND HIGH ENERGY INTERACTIONS

Apr 2021

New physics and $g_\tau - 2$ using LHC heavy ion collisions—invited seminar

EXPERIMENTAL ASTROPARTICLE AND PARTICLE PHYSICS SEMINAR

ETH

Feb 2021

Top Quarks and the Little Bang Standard Model—invited seminar

TOPIC OF THE WEEK

Fermilab

Oct 2020

Evidence of top quark pair production in nucleus-nucleus collisions with CMS

10TH INTERNATIONAL CONFERENCE ON HARD AND ELECTROMAGNETIC PROBES, XXVIIITH INTERNATIONAL CONFERENCE ON ULTRARELATIVISTIC NUCLEUS-NUCLEUS COLLISION

Wuhan, Austin

Nov 2019, June 2020

Conference and workshop organizations

2nd CMS Heavy Ion Workshop (fully funded by ECT*)

TRENTO, ITALY

International Workshop,
Collaboration Meeting

2023

US CMS Week

LAWRENCE, KS

Collaboration Meeting

2023

Low- x (second edition in Greece)

LEROS, GREECE

International Workshop

2023

1st CMS Heavy Ion Workshop

CERN

International Workshop,
Collaboration Meeting

2022

Press

2022	Using light to make cousins of the electron , Physics briefings	CMS
2021	High-school students “connect Quarks with the Cosmos” using CMS open data , Physics briefings	CMS
2021	Counting collisions precisely at CMS , CERN Courier Article	CERN
2021	Illuminating! Counting LHC collisions with CMS , Physics briefings	CMS
2021	Jetting through a droplet of matter from the early universe , Physics briefings	CMS
2021	Our analysis featured as CERN Highlight in 2020 , Video	CERN
2020	CMS sees evidence of top quarks in collisions between heavy nuclei , Press release , News , Interview	CERN, phys.org
2020	Heavy metal hits the top , Physics briefings	CMS
2020	Top quark production in heavy ion collisions , Weekly Message to the Physics Community	MIT
2017	Top Quark in Nuclear Collisions , Synopsis	PRL
2017	CMS observes top quarks in proton–nucleus collisions , Article	CERN Courier
2017	CMS observes top quarks in proton–nucleus collisions , News	FNRS

Student supervision

[S. Arteaga](#), Dijet correlated production in pPb UPC

PROJECT FUNDED BY DOE-NP

CMS

2022 – Present

[L. Alcerro](#), Resolving the time dimension in jet quenching studies of the QGP

PROJECT FUNDED BY DOE-NP

CMS, Phenomenology

2021 – Present

[C. Le Mahieu](#), [J. Marquez](#), Luminosity and Zero Degree Calorimeter calibration using ultraperipheral collisions

PROJECT FUNDED BY DOE-NP

CMS

2021 – Present

[M. Nickel](#), Measuring τ lepton $g - 2$, Zero Degree Calorimeter calibration

PROJECT FUNDED BY DOE-NP

CMS, Phenomenology

2020 – Present

[C. Baldenegro](#), Luminosity calibration

CRISTIAN JOINED THE LLR GROUP TO STUDY MODIFICATIONS OF B JETS IN THE QGP WITH THE CMS EXPERIMENT

CMS

2019 – Present

J. Williams, Search for exclusive diphoton production in association with two forward protons	CMS
JUSTIN JOINED THE APPLIED PHYSICS LABORATORY IN THE JOHNS HOPKINS UNIVERSITY AS SENIOR STAFF RESEARCHER	2019 – Present
T. Isidori, Search for anomalous $Z(\ell\ell)+X$ production in association with two forward protons	CMS
TOMMASO JOINED THE KU GROUP TO PERFORM UPGRADE STUDIES FOR THE FOCAL DETECTOR WITH THE ALICE EXPERIMENT	2019 – Present
F. Eble, Luminosity calibration and software development	CMS
FLORIAN JOINED THE ETH GROUP TO SEARCH FOR SIGNS OF DARK MATTER WITH THE CMS EXPERIMENT	2019
Luuk Vermunt, Top quark pair production in the semileptonic final state in heavy-ion collisions	CMS
LUUK JOINED THE UTRECHT GROUP TO STUDY HEAVY-FLAVOR PRODUCTION IN NUCLEAR COLLISIONS WITH THE ALICE EXPERIMENT.	2016

Other roles and Outreach

Responsible for central CMS data acquisition and leader of the shift crew	CERN
DATA-TAKING CAMPAIGNS TO SUPPORT RUNNING, COMMISSIONING, AND CRUZET (COSMIC RAYS AT ZERO TESLA) ACTIVITIES	Jan 2015 - PRESENT
Quarks to cosmos	CERN
CERN HIGH-SCHOOL STUDENTS INTERNSHIP PROGRAM	Sep 2021
CMS official guide	CERN
CMS IS THE ONLY EXPERIMENT WHERE ONE CAN VISIT THE UNDERGROUND FACILITIES DURING THE LHC RUNNING PERIOD	June 2017 - PRESENT
Présentations pour la Voyage au CERN 2017	UCLouvain
INTRODUCTION TO THE HEAVY-ION PHYSICS IN THE ALICE EXPERIMENT	Mar 2017
CMS Create 2	CERN Ideasquare
AN INTERACTIVE EXHIBIT CONTEST FOR THE PUBLIC VISIT EXPERIENCE AT CMS	Oct 2016

References

- [1] S. Michael, “Top quark in nuclear collisions”, 2017. <https://physics.aps.org/articles/v10/s139>.
- [2] CERN Courier, “CMS observes top quarks in proton-nucleus collisions”, 2017. <https://cerncourier.com/a/cms-observes-top-quarks-in-proton-nucleus-collisions>.
- [3] F. Peter, “Weekly message to the physics community”, 2020. <https://fisherp.mit.edu/?p=1596>.
- [4] CERN, “CMS sees evidence of top quarks in collisions between heavy nuclei”, 2020. <https://home.cern/news/news/physics/cms-sees-evidence-top-quarks-collisions-between-heavy-nuclei>.
- [5] LIP, “First observation of top quarks in heavy ion collisions”, 2020. <https://www.lip.pt/?section=press&page=news-details&id=990&ref=homepage&lang=en>.
- [6] Phys.org, “Evidence of top quarks in collisions between heavy nuclei”, 2020. <https://phys.org/news/2020-10-evidence-quarks-collisions-heavy-nuclei.html>.
- [7] G. K. Krintiras, “First measurements of the $t\bar{t}$ cross section in LHC pp and pPb collisions at 5.02 and 8.16 TeV and determination of the absolute luminosity in the CMS experiment”. PhD thesis, Université catholique de Louvain (UCL) (BE), 11, 2018.
- [8] CMS Collaboration, “Physics organization”, 2019. https://cms-docdb.cern.ch/cgi-bin/PublicDocDB/RetrieveFile?docid=3798&filename=Physics-OrganizationChart_2019-2020.pdf&version=13.
- [9] CMS Collaboration, “Physics organization”, 2022. <https://cms-docdb.cern.ch/cgi-bin/PublicDocDB/RetrieveFile?docid=3798>.