

# Efe Yazgan

RESEARCH FACULTY · NATIONAL TAIWAN UNIVERSITY

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## Current and Past Roles

### Coordinator/Convener Roles

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|--|----------------|
| • Co-convener ( <i>L3</i> ) of the CMS Top Quark + X + Bosons Physics Group                            | 2025 – present |
| • Coordinator of the NTU CMS analysis group for extra Yukawa couplings and new Higgs boson searches    | 2020 – present |
| • Co-PI Decadal Mission for the New Higgs/Flavor Physics Era of NSTC Grant 113-2639-M-002-006          | 2024 – 2025    |
| • Co-PI Search for new Yukawa couplings at the LHC with heavy quarks of NSTC Grant 1110-2112-M-002-017 | 2021 – 2023    |
| • Co-convener of the High Energy Physics Software Foundation (HSF) Physics Generators group            | 2020 – 2023    |
| • Co-convener ( <i>L2</i> ) of the CMS Monte Carlo Event Generators                                    | 2017 – 2019    |
| • Co-convener ( <i>L3</i> ) of the CMS Physics Comparisons and Generator Tunes                         | 2016 – 2017    |
| • Co-convener ( <i>L3</i> ) of the CMS Top Quark Event Modelling Generators                            | 2015 – 2017    |
| • Co-convener ( <i>L3</i> ) of the CMS Top Quark Properties  | 2013 – 2014    |
| • Co-convener ( <i>L3</i> ) of the CMS Electroweak Dilepton physics group                              | 2010 – 2011    |
| • Co-coordinator of the CMS Hadron Calorimeter (HCAL) Data Certification detector group                | 2009 – 2011    |
| • Co-coordinator of the HCAL Prompt Analysis detector group  | 2008 – 2009    |

Geneva, Switzerland

### Reviewer, Editor, Committee, Consultant Tasks

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|--|-------------------|
| • Review Committee Chair (for a CMS top quark analysis)  | 2024 – present    |
| • Review Committee member for > 20 CMS Higgs, top, and electroweak, and modeling studies   | 2012 – present    |
| • Editorial Board Member of the Physics Section of the Symmetry (MDPI) journal   | 2024 – present    |
| • Reviewer for the journals Particles, Galaxies, and Symmetry (MDPI)   | 2025 – present    |
| • Assessment of self-citations of manuscripts for the Symmetry journal   | 2025              |
| • Co-editor of the special journal issue New Higgs-like states in the Symmetry journal   | 2024 – present    |
| • Co-editor of the special journal issue Top quark at the new physics frontier in the Universe (MDPI) journal                              | 2021 – 2024       |
| • Reviewer for the journal Physics of the Dark Universe (ELSEVIER)   | 2023              |
| • Reviewer for QEIOS for an astrophysics preprint  | 2023              |
| • Book reviewer for CRC press (Routledge)  | 2022              |
| • Reviewer for the European Physical Journal C   | 2019 – 2020       |
| • Reviewer for Physics Letters B (ELSEVIER)  | 2017 – 2018, 2020 |
| • Jury member for the Ph.D. thesis of Deniz Poyraz (Ghent University)  | 2018              |
| • Consultant for the project Free electron distribution in the Galaxy, distances to pulsars and magnetic fields of neutron stars (TUBITAK) | 2015 – 2018       |
| • Jury and the reading committee for the Ph.D. thesis of Kelly Beernaert (Ghent University)  | 2015              |
| • Scientific advisor for the Turkish translation of the book Albert Einstein and Relativity for Kids (TUBITAK)                             | 2015              |
| • Operations research committee for Izmir HEP Workshop; New Physics at the LHC and Turkey-CERN relations                                   | 2013              |
| • Co-editor of the Book Neutron Stars, Supernovae and Supernova Remnants, Nova   | 2007              |

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### Contact person

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| • Harmonization of Modeling Uncertainties in ATLAS & CMS Top Quark Measurements in the TOPLHC WG           | 2021 – present |
| • CMS Event Simulation Sample Verification Script contact  | 2019 – present |
| • HEP Software foundation Physics Generators Working Group CMS Contact person                              | 2019 – 2023    |
| • CMS Top quark conference contact person  | 2014 – 2019    |
| • CMS HCAL contact for global runs, particle flow, and the physics validation team                         | 2007 – 2011    |
| • CMS Calorimeter noise contact person in V+Jets group   | 2010           |
| • CMS Physics Validation team contact person for HCAL  | 2009 – 2011    |
| • Data reconstruction/transfer for CMS ECAL/HCAL Test beam2006 to set up the 1st remote ops. center of CMS | 2007 – 2008    |

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### Conference/Workshop Tasks

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|---|------------|
| • Co-organizer, the HSF Event Generator Tuning Workshop, Virtual  | 2007 – now |
| • Co-organizer, the MC4EIC 2022, workshop on Monte Carlo event simulation for the EIC, Virtual            | Jun. 2023  |
| • Chair, the parallel session "Standard Model Physics at the TeV Scale" in PANIC2021 Conference, Virtual  | Nov. 2022  |
| • Co-organizer, the HEP Software Foundation Worldwide LHC Computing Grid (WLCC), Virtual                  | Sep. 2021  |
| • Local organizing committee, 12th International Workshop on Top Quark Physics, Beijing, China            | Nov. 2020  |
| • Chair, Plenary: FCNC and EFT, 11th International Workshop on Top Quark Physics, Bad Neuenahr, Germany   | Sep. 2019  |
| • Organizing Committee/Simulation Session Convener, CMS Heavy flavour tagging workshop, Brussels, Belgium | Sep. 2018  |
| • Theory and Modeling Session Convener in TOP@100 fb <sup>-1</sup> Workshop, CERN, Geneva, Switzerland    | Apr. 2018  |
|   | Nov. 2016  |

# Selected publications (in the last five years)

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## Journal papers

- Review of top quark mass measurements in CMS, *Phys. Rep.* 1115 (2025) 116
- Top Quark at the New Physics Frontier, Eds. E. Yazgan and P. Silva., (2024) doi.org/10.3390/books978-3-7258-0614-0
- Search for new Higgs bosons via same-sign top quark pair production in association with a jet in proton-proton collisions at  $\sqrt{s} = 13$  TeV, CMS Collaboration, *Phys. Lett. B* 850 (2024) 138478
- CMS PYTHIA 8 colour reconnection tunes based on underlying-event data, CMS Collaboration, *Eur. Phys. J. C* 83 (2023) 587
- Distances of galactic radio pulsars; first quadrant:  $-2 < \ell < 90$  and  $-2 < b < 2$ , P. Kutukcu, A. Ankay, E. Yazgan, and K. Bozkurt, *Mon. Not. Roy. Astro. Soc.* 511 (2022) 4669
- Challenges in Monte Carlo Event Generator Software for High-Luminosity LHC, A. Valassi, E. Yazgan, J. McFayden et al., *Comput. Softw. Big Sci.* 5 (2021) 12
- Extraction and validation of a new set of CMS PYTHIA8 tunes from underlying-event measurements, CMS Collaboration, *Eur. Phys. J. C* 80 (2020) 4

## Preprints and Proceedings

- Measurements of top quark properties in CMS:  $t\bar{t}$  spin density matrix, quantum entanglement and quantum magic, E. Yazgan, arXiv:2510.13743 (2025)
- Search for charged Higgs bosons decaying into a top and a bottom quark in proton-proton collisions at  $\sqrt{s} = 13$  TeV, CMS Collaboration, CMS-PAS-B2G-24-008 (2025)
- Input to European Strategy Update for Particle Physics: Sustainability, V. Boisvert et al. arXiv:2504.03012 (2025)
- Event Generators for High-Energy Physics Experiments, J. M. Campbell et al. arXiv:2203.11110 (2022 – 2025)
- TF07 Snowmass Report: Theory of Collider Phenomena, F. Maltoni, et al. arXiv:2210.02591, FERMILAB-FN-1203-QIS (2022)
- Modelling the Data at the LHC, E. Yazgan, arXiv:2110.02599, CMS CR-2021/166; PoS (PANIC2021) 410 (2021)
- HL-LHC Computing Review Stage-2, Common Software Projects: Event Generators, E. Yazgan, et al. arXiv:2109.14938 [hep-ph, hep-ex, physics.comp-ph]; FERMILAB-PUB-21-526-OCIO-SCD-T (2021)

[Link to full list of selected publications](#) • [Link to full list of \(~ 1400\) publications](#) • [Link to preprints in arXiv](#)

# Presentations (in the last five years)

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## Top quark properties in CMS: $t\bar{t}$ spin density matrix, quantum entanglement, and quantum magic

EPS-HEP CONFERENCE (TALK ON BEHALF OF THE CMS COLLABORATION)

Marseille, France

7 – 11 July 2025

## Searches for Additional Scalar Bosons with the CMS Experiment

HIGGS HUNTING 2024 WORKSHOP (PLENARY TALK ON BEHALF OF THE CMS COLLABORATION)

Paris, France

23 – 25 September 2024

## ATLAS and CMS Top Quark Rare Searches (Flavor Changing Neutral Currents)

STANDARD MODEL AT THE LHC 2024 WORKSHOP (PLENARY TALK ON BEHALF OF THE ATLAS & CMS COLLABORATIONS)

Rome, Italy

7 – 10 May, 2024

## CMS Highlight talk: Search for extra Higgs bosons through same-sign top-quark production in association with an extra jet

LHC TOP WORKING GROUP MEETING (PLENARY TALK ON BEHALF OF THE CMS COLLABORATION)

Fully online workshop

29 Nov – 1 Dec, 2023

## Modelling the data at the LHC

PANIC2021 (22ND PARTICLES AND NUCLEI INTERNATIONAL CONFERENCE) (PLENARY TALK ON BEHALF OF THE ATLAS & CMS COLLABORATIONS)

Fully online conference

5 – 10 September 2021

## Harmony between ATLAS and CMS (in systematic uncertainty estimations)

LHC TOP WG MEETING (PLENARY TALK ON BEHALF OF THE ATLAS & CMS COLLABORATIONS)

Fully online workshop

1 – 3 December 2021

## Top Quark Properties

8TH EDITION OF THE LARGE HADRON COLLIDER PHYSICS CONFERENCE (LHCP2020) (PLENARY TALK ON BEHALF OF THE ATLAS & CMS COLLABORATIONS)

Fully online conference

25-30 May 2020

## [Hyperlink to full list of presentations](#)

## Positions

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### Research faculty (based at CERN)

NATIONAL TAIWAN UNIVERSITY, TAIPEI, TAIWAN

Geneva, Switzerland

2020 - PRESENT

### Post-doc fellow (based at CERN)

INSTITUTE OF HIGH ENERGY PHYSICS (IHEP), CHINESE ACADEMY OF SCIENCES, BEIJING

Geneva, Switzerland

2016 - 2020

### Post-doc fellow (based at CERN)

UNIVERSITY OF GHENT, BELGIUM

Geneva, Switzerland

2011 - 2016

### Postdoctoral research associate (based at CERN)

TEXAS TECH UNIVERSITY, TX, USA

Geneva, Switzerland

2007 - 2011

### Guest scientist and software developer

FERMI NATIONAL ACCELERATOR LABORATORY (FERMILAB)

Batavia, IL, USA

2005 - 2007

### Research and teaching assistant

MIDDLE EAST TECHNICAL UNIVERSITY (METU)

Ankara, Turkey

2000 - 2007

## Education

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### Middle East Technical University with host laboratory: Fermilab

PHD IN PHYSICS

Ankara, Turkey / Batavia, IL, USA

2002 - 2007

- GPA: 3.61/4.00; Mentors: Shuichi Kunori and Dan Green; Thesis: "Search for a Standard Model Higgs Boson in CMS via Vector Boson Fusion in the  $H \rightarrow W^+W^- \rightarrow \ell^+\ell^-\nu\bar{\nu}$  Channel and Optimization of Energy Reconstruction in CMS using Test Beam 2006 Data" fermilab-thesis-2007-13.

### Middle East Technical University

MSC IN PHYSICS (SPECIALISATION IN ASTROPHYSICS)

Ankara, Turkey

2000 - 2002

- GPA: 3.56/4.00; Supervisor: S. Balman. Thesis: "Timing Characteristics of Intermediate-Polar Cataclysmic Variables and Data Analysis of YY Draconis"

### Middle East Technical University

BS IN PHYSICS

Ankara, Turkey

1996 - 2000

- GPA: 3.31/4.00; Undergraduate special advanced physics class

## Honors & Awards

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### Breakthrough Prize in Fundamental Physics

, awarded to E. Yazgan and colleagues in the CMS Collaboration at the LHC for detailed measurements of Higgs boson properties confirming the

2025 symmetry-breaking mechanism of mass generation, the discovery of new strongly interacting particles, the study of rare processes and matter-antimatter asymmetry, and the exploration of nature at the shortest distances and most extreme conditions at CERN's Large Hadron Collider. Los Angeles, USA

2025 Exceptional Reviewer 2025, for the Symmetry Journal

Basel, Switzerland

Geneva,

Switzerland

2019 CMS achievement award, for work in the validation tools for generators and for sample production

Amsterdam,

Netherlands

2018 Outstanding Contribution in Reviewing , from the Editors of Physics Letters B

2013 European Physical Society High Energy and Particle Physics Prize, awarded to the CMS Collaboration for the discovery of a Higgs boson, as predicted by the Brout-Englert-Higgs mechanism Stockholm, Sweden

2007 CMS achievement award, for crucial contributions to analyses of ECAL+HCAL beam tests and global runs

Geneva,

Switzerland

# Supervision

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T.-H. Hsu “Extra Yukawa and new Higgs boson searches with g2HDM” (PhD supervisor)

Geneva, Switzerland

National Taiwan Univ. 2020 – present

N. Bulte, “Search for Scalar Top Quark Partners & Parton Shower Tuning in Modelling Top Quark Pairs” (MSc supervisor)

Geneva, Switzerland

Ghent Univ. 2016

K. Beernaert, “Spin Correlations in  $t\bar{t}$  Systems in the  $\mu+\text{jets}$  channel using a Matrix Element Method with the CMS Detector at the LHC” (PhD supervisor)

Geneva, Switzerland

Ghent Univ. 2012 – 2015

B. Bilin, “Measurements of standard model heavy particle production in association with jets using proton-proton collision data at 8 and 13 TeV with the CMS experiment at the LHC” (PhD mentor)

Geneva, Switzerland

Middle East Tech. U. 2011 – 2016

M. O. Sahin, “Search for Z’ via Forward Backward Asymmetry in Dielectron Channel with the CMS Detector at the Large Hadron Collider” (MSc mentor)

Geneva, Switzerland

Middle East Tech. U. 2011 – 2012

B. Bilin, “Production of Z+Jet Events and HF Jet Energy Scale Calibration at 7 TeV in the CMS Experiment at LHC” (MSc mentor)

Geneva, Switzerland

Middle East Tech. U. 2010 – 2012

Y. J. Roh, “Measurement of the Forward-Backward Asymmetry in  $\gamma/Z$  Boson to Dilepton Events in Compact Muon Solenoid at a Center-of-mass Energy of 7 TeV” (PhD mentor)

Geneva, Switzerland

Texas Tech. U. 2009 – 2011

Geneva, Switzerland

## Supervised summer projects at CERN

- B. Ors (Ecole Jeannine Manuel, Paris), *Job Shadowing* in CMS 2025
- G. Vandierendonck (Ghent Univ.) “Four Top Quark Production at the High Luminosity LHC” 2016
- N. Bulte (Ghent Univ.), “Determination of the Top Quark Pole Mass at  $\sqrt{s}=7,8,$  and 13 TeV” 2015
- I. Michiels (Ghent Univ.) , “ $t\bar{t}$  Spin Correlation in the  $t\bar{t}H$  Channel” 2014
- S. Demulder (Vrije Univ. Brussels), “Can the Incline Asymmetry be Observed at the LHC” 2014
- J. Duvillier (Ghent Univ.), “Energy Asymmetry Measurement using  $t\bar{t}+\text{jet}$  Systems at  $\sqrt{s}=8$  TeV in CMS” 2014
- C. Moortgat (Ghent Univ.), “Effects of Non-Zero Chromo-Moments on  $t\bar{t}$  Spin Correlation” 2013
- M. Unal (CERN, Geneva), “Analyses of Z+1 Jet Events using the Full Rapidity Coverage of CMS” 2012
- M. Orlov (CERN, Geneva), “Validation of Single Particle Response in HCAL” 2008

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## Supervised postdocs

- Gouranga Kole, “Extra Yukawa and new Higgs boson searches with g2HDM” 2022 – present
- Agostino De Iorio, “Extra Yukawa and new Higgs boson searches with g2HDM” 2023 – present

Geneva, Switzerland

## Coach

- high school students for the CERN/DESY beamline for schools competition 2021

# Teaching

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## Lectures at the Hadron Collider School (HASCO)

TOP QUARK PHYSICS

Gottingen, Germany

2014 – 2017

## Lectures at CERN Teachers Programs (TTP)

ASTROPARTICLE PHYSICS (NEUTRINOS, ASTROPARTICLE PHYSICS, GRAVITATION AND COSMOLOGY)

Geneva, Switzerland

2015 – 2020

## Lectures at ERASMUS ISSCSMB-12, International Summer School and Conference on High Energy Physics: Standard Model and Beyond

TOP QUARK PHYSICS AT COLLIDERS

Belek/Antalya, Turkey

28 Aug – 8 Sep 2012

## Problem sessions and laboratory courses at METU

GRADUATE ELECTROMAGNETIC THEORY I, PHYSICS FOR STUDENTS IN SCIENCE I & II, CONCEPTS OF MODERN PHYSICS,  
FRESHMEN PHYSICS LABORATORY I & II, EXPERIMENTS IN PHYSICS

Ankara, Turkey

2000 – 2005

# Tutorials

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## Tutorials on the two main tools in Monte Carlo production: Monte Carlo request Management and Production Monitoring Platform

Geneva, Switzerland

2017 – 2018

## Data Quality Monitoring (DQM) shift tutorials

Geneva, Switzerland

2009 – 2012

# Science Communication

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- **The best non-technical books to get interested in knowing the Universe** published in *Shepherd.com*, 2024
- **Towards the New Physics Higgs/Flavor Era**, poster in *ASP March meeting*, Taiwan. 2024
- **Hunting the Higgs Boson Siblings with Top Quarks**, *CMS Physics Briefing*, 2023
- **Higgs physics**, presentation in *Turkey-CERN status review*, CERN, Geneva, Switzerland, 2022
- **Search for extra Higgs Bosons at the LHC**, E. Yazgan et al. poster in *ASP March meeting*, Taiwan. 2022
- **Data science in high energy particle physics**, invited talk in *Istanbul Tech Week* (online conference), 2020
- **Old School Electroweak** in *CMS Result of the Month in Fermilab Today*, 2012
- Poster for **CERN: Accelerating Science Exhibition**, METU, Ankara, Turkey. 2012
- **Interview about CERN**, published in the journal *Radikal*, and *Matematik Dünyası*, 86 (2011) 20. 2011
- **Rediscovering the Weak Force** in *CMS Result of the Month in Fermilab Today*, 2010
- **Interviews on the LHC First Beam Day** on *CNN Turk*, 2008
- **Interview about CERN, Experiment of the Century**, published in the journal *Radikal*, 2007
- **Nobel physics prizes in astrophysics**, *Bilim ve Utopya*, 2003
- **METU Physics Department Outreach Days for High School Students**; Ankara, 2002, 2003

# Programming and software

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- Python, C/C++, Fortran, Shell, R, Bash, ...
- ROOT, CMSSW, Git, JIRA, Event generators, Mathematica, ...
- Latex, HTML/CSS, Markdown, ...

# Languages

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ENGLISH, FRENCH, TURKISH