

PERSONAL INFORMATION **Noemi Palmeri**

EDUCATION AND TRAINING

- 2023–Present **PhD in Physics, Sapienza University of Rome** ISCED 8
Rome, Italy
Supervisors: Dr. Livia Soffi, Prof. Daniele Del Re.
I am currently in my second year of PhD with the CMS Rome group, engaging in complementary work involving both physics analysis and detector studies. My research includes:
- service tasks: completed by contributing to MIP Timing Detector (MTD) reconstruction software development, focusing on track time uncertainties and their usage in 4D vertex reconstruction.
 - hardware studies: contributed to LYSO crystal characterization for the Barrel Timing Layer (BTL) and operation of the Electromagnetic Calorimeter (ECAL).
 - analysis: leading the analysis effort for the search for low-mass exotic resonances decaying to dielectrons using Run 3 data acquired through novel data streams. This analysis marks the first search for new physics in the low-energy dielectron spectrum within the CMS collaboration.
- 2021–2023 **Master's Degree in Physics, Sapienza University of Rome** ISCED 7
Rome, Italy
Grade: 110/110 cum laude
Thesis: "*Dimuon trigger characterization for the study of the multiquark candidate $X(3872)$ at LHC Run 3 with the CMS experiment*"
Supervisors: Dr. Chiara Rovelli, Dr. Livia Soffi
- Conducted research on the $X(3872)$ multiquark candidate in B meson decays in the first data acquired in 2022 during LHC Run 3 by the CMS experiment. To maximize the measurement sensitivity, a new low-energy dimuon trigger introduced in Run 3 has been employed, whose performance has been also characterized.
 - Admitted to the Honours Programme in Physics, reserved to each year's top scoring students.
- 2018–2021 **Bachelor's Degree in Physics, Sapienza University of Rome** ISCED 6
Rome, Italy
Grade: 110/110 cum laude
Thesis: "*Particle identification through pulse shape discrimination at Belle II*"
Supervisors: Dr. Francesco Pandolfi, Dr. Savino Longo
- Admitted to the Honours Programme in Physics, reserved to each year's top scoring students.
- 2018–2023 **Collegio Universitario dei Cavalieri del Lavoro "Lamaro Pozzani"**
Rome, Italy
University college with competitive access belonging to the "Conferenza Collegi di Merito" (honours colleges consortium) Italian network. Offers courses on entrepreneurship, management, geopolitics, demography, and language courses.

EXPERIENCE

ANALYSIS

2024 Search for Low-Mass Exotic Resonances Decaying to Dielectrons

CERN, Geneva, Switzerland

Leading analysis for the search of low-mass exotic resonances decaying to dielectrons using CMS Run 3 data acquired with novel data streams, exploiting the new low- p_T dielectron triggers introduced in the context of data parking.

Responsible of characterizing trigger performance, developing reconstruction and identification tools for low- p_T (< 10 GeV) electrons, and defining the primary analysis strategy.

September 2024 – Present EXO Electron Contact

CERN, Geneva, Switzerland

Selected as Contact person between the Exotica Physics Analysis Group (EXO PAG) and the Electron and Photon Physics Object Group (EGM POG) for electrons, focusing on the low- p_T range.

I am responsible for reviewing the usage of electrons in EXO analysis during the pre-approval stage, ensuring POG recommendations are followed and overseeing the development and validation of custom tools when needed.

April 2024 – Present Dielectron Parking Trigger Contact

CERN, Geneva, Switzerland

Serving as contact person for low- p_T dielectron parking triggers for 2024-2025.

I am responsible for interacting with the EXO PAG and the Trigger Studies Group on matters including trigger efficiency monitoring, bandwidth management and eventual updates to the trigger path configuration.

DETECTOR

2024 ECAL Detector on Call

CERN, Geneva, Switzerland

Took part to the data taking campaign monitoring effort as ECAL Detector on Call shifter. I was responsible for ensuring smooth data taking by the CMS electromagnetic calorimeter, while also guaranteeing the quality of the recorded data.

2024 BTL Crystal Characterization

Sapienza University of Rome, Rome, Italy

Contributed to characterizing LYSO crystals used in the construction of the Barrel Timing Layer (BTL) detector as part of the CMS Rome group's Phase 2 upgrade responsibilities.

29 January – 9 February 2024 ECAL Barrel HV Calibration

CERN, Geneva, Switzerland

Contributed to the calibration of the High Voltage system of the CMS ECAL barrel as HV expert, necessary to ensure the quality of the 2024 data taking campaign.

2 – 12 November 2022 ECAL Test Beam

CERN, Geneva, Switzerland

Took part in the test beam of the Phase 2 upgrade of the DAQ electronics for the ECAL of the CMS experiment, aimed at characterizing the calorimetric and timing properties of the setup.

NATIONAL AND INTERNATIONAL CONFERENCES**7–9 October 2024 CMS Italia**

Held the plenary talk "*An overview of Beyond the Standard Model searches in CMS with a focus on Italian contributions*" ([link](#)), outlining the general direction and most relevant results of searches for Beyond the Standard Model physics in CMS in the past year, with dedicated focus on my ongoing work related to my PhD thesis.

16–20 September 2024 CMS Upgrade Week

Held the talk "*Search for low mass dielectron resonances with dedicated data streams in Run 3: an overview*" ([link](#)) at the Exotica General Meeting on the status of the search for low-mass dielectron resonances, documenting the physics motivation and analysis strategy outline, as well as recent developments and prospects on low- p_T electron object tools.

Also presented the poster "*Towards a precise measurement of particles time-of-flight with the new Mip Timing Detector for the CMS Experiment*" ([link](#)), focusing on the latest developments I implemented in the MTD reconstruction software related to track time uncertainty estimation and its usage in 4D vertex reconstruction.

18–24 July 2024 ICHEP 2024

Presented the poster "*Towards a precise measurement of particles time-of-flight with the new Mip Timing Detector for the CMS Experiment*" ([link](#)) on my contributions to the MTD track and vertex reconstruction software, focusing on the handling of uncertainties.

Proceedings will be published in "[Proceedings of Science](#)".

3–5 April 2024 IFAE 2024

Presented the poster "*Verso una misurazione precisa del tempo di volo delle particelle con il nuovo Mip Timing Detector nell'esperimento CMS*" ([link](#)) on my contributions to the MTD vertex reconstruction software.

Proceedings will be published on the journal "Il Nuovo Cimento - Colloquia and Communications in Physics".

11-15 September 2023 109° Congresso Nazionale SIF, Salerno, Italy

Presented my master's thesis work at the annual conference of the Società Italiana di Fisica (Italian Physics Society) in the parallel talk "*Studio del candidato multiquark esotico $X(3872)$ con i primi dati raccolti dall'esperimento CMS durante il Run 3*" ([link](#)).

Awarded with the prize for second best presentation in the Nuclear and Subnuclear Physics category; proceedings have been published on a [dedicated issue](#) of the journal *Il Nuovo Cimento C*.

GRANTS AND PRIZES**2024 Sapienza Research Call "Research Initiation Project" ("Avvio alla Ricerca")**

Project: "Search for new physics with dedicated data streams at CMS"

1000 € grant awarded on a competitive basis to support research initiation projects for early-career researchers, fostering international career development, scientific independence, and advancement of their research.

For this project, I am leading the search for new physics in the low-mass spectrum of dielectron signatures at colliders, with an initial focus on dielectrons, using data acquired during LHC Run 3 using innovative data streams.

2023 Best Communication Award at 109° SIF National Congress

Awarded with the prize for second best communication at the 109° SIF National Congress in the Nuclear and Subnuclear Physics category for the presentation "Studio del candidato multiquark esotico $X(3872)$ con i primi dati raccolti dall'esperimento CMS durante il Run 3". Winning communications are awarded with an open-access publication on *Il Nuovo Cimento C*.

2023 INFN Scholarship n. 25247/2022

3000 € scholarship assigned on a competitive basis to 7 master students pursuing a thesis on experimental physics at INFN Rome. My project focused on the study of the multiquark candidate $X(3872)$ exploiting B meson decays in the first data acquired in 2022 during LHC Run 3 by the CMS experiment.

SCHOOLS

25 September – 8 October 2024

ESHEP (European School of High-Energy Physics) 2024, Peebles, Scotland

Admission to the school is granted to 100 participants on a competitive basis from references and past experience.

The school is aimed at students in experimental HEP who are in the final years of work towards their PhDs. It comprises approximately 30 lectures on selected topics in high-energy physics, as well as dedicated outreach training sessions and group projects.

17–22 June 2024

CMSDAS 2024, CERN, Geneva, Switzerland

Admitted to a data analysis school targeted at CMS physicists. For the school, I was part of a B -physics analysis team working on the measurement of the branching fraction of the $B_s^0 \rightarrow \mu^+ \mu^-$ rare decay. My team was awarded the Systematics prize for the most accurate evaluation of systematic uncertainties.

July – September 2022

PSI Summer Student Programme, Paul Scherrer Institut, Villigen, Switzerland

Worked for two months as a summer student at the Paul Scherrer Institut with the MEG-II collaboration on the commissioning of the gas monitoring detector of the experiment's drift chamber. My tasks involved tuning the experimental set-up and acquiring and analyzing data. I was also involved with the set-up of a Time Projection Chamber detector for the characterization of the gas mixture currently used in the experiment. Worked under the supervision of Dr. Francesco Renga, Prof. Cecilia Voena and Prof. Gianluca Cavoto.

TEACHING AND SUPPORT

7 – 9 October 2024

CMS Italia, Rome, Italy

Supported the local organizing committee for the annual meeting of the CMS Italian community, hosting over 100 participants.

August 2024

INFN Summer Student Supervision, CERN, Geneva, Switzerland

Supervised INFN summer students in their designated projects, involving characterization of MTD timing properties, and usage of machine learning techniques to improve the reconstruction of boosted dielectrons.

29 November – 1 December 2023

CMS Exotica Workshop, Sapienza University of Rome, Rome, Italy

Supported the local organizing committee for the yearly workshop on exotic searches in CMS, attended by over 100 participants.

OUTREACH

2022–2024 **HEPscape!, Sapienza University of Rome, Rome, Italy**

High energy physics-themed escape room run by the University of Rome *La Sapienza* group to give kids and young adults an introduction to particle physics. I contributed to the setup and running of the activity at, among other events, the *European Research Night*, *Festival delle Scienze 2022*, *INFN-LNF OpenLabs 2023* and *Salone del Libro 2024*.

2022 **CMS Physics Masterclass, Sapienza University of Rome, Rome, Italy**

I supported high school students in analyzing CMS data through event displays, providing an introduction to LHC physics and the CMS experiment through lectures and hands-on activities.

2020–2021 **Physics Museum, Sapienza University of Rome, Rome, Italy**

Student-collaboration scholarship with Department of Physics. I was responsible of surveillance duty and guided tours including Mechanics and Acoustics demonstrations, Spectroscopy and Nuclear Physics, for visiting students from middle to high school.

PUBLICATIONS

- Public**
- CMS Collaboration, "Update of the vertex reconstruction using track time from MTD", *CMS DP-2024/085*, <https://cds.cern.ch/record/2914583>.
 - CMS Collaboration, "Improved use of MTD time in vertex reconstruction", *CMS DP-2024/048*, <https://cds.cern.ch/record/2904361>.
 - CMS Collaboration, "Towards a precise measurement of particles time-of-flight with the new Mip Timing Detector for the CMS Experiment", PoS(ICHEP2024)951, ICHEP 2024 conference proceedings, in preparation.
 - CMS Collaboration, "Verso una misurazione precisa del tempo di volo delle particelle con il nuovo Mip Timing Detector nell'esperimento CMS", *Il Nuovo Cimento*, IFAE 2024 conference proceedings, in preparation.
 - N. Palmeri for the CMS Collaboration, "Dimuon trigger characterization for the study of the multi-quark candidate $X(3872)$ at LHC Run 3 with the CMS experiment", *Il Nuovo Cimento* **47 C** (2024) 252, 10.1393/ncc/i2024-24252-3.
- Internal**
- CMS Collaboration, "Search for low-mass resonances decaying to dielectrons in Run 3 parking data", *CMS AN-2024/219*.
 - CMS Collaboration, "Update of the vertex reconstruction using track time from MTD", *CMS AN-2024/190*.