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Current Position

Associate Professor
Department of Physics, Sapienza Università di Roma, Rome, Italy

Research Groups

2005 - today **Member of the CMS collaboration at the CERN Large Hadron Collider (LHC)**
CMS is one of the two general purpose particle physics detectors operated at LHC.

2014 - 2017 **Member of the i-MCP collaboration**
i-MCP is an R&D project within INFN CSN5 aimed at use of micro-channel plates for fast timing detection of single particles and electromagnetic showers at collider experiments.

Employment History

01/2018 - today **Associate Professor in Physics**
Sapienza Università di Roma, Rome, Italy

03/2014 - 12/2017 **Assistant Professor in Physics (RTDb)**
Sapienza Università di Roma, Rome, Italy

09/2011 - 12/2013 **CERN Research Fellow in Experimental Particle Physics**
CERN, Geneve, Switzerland
Contact: Dott. Maurizio Pierini (CERN)

12/2007 - 08/2011 **Post-Doctoral Research Assistant (Post-Doc) in Particle Physics**
University of Maryland, College Park, MD, US
Contact: Prof. Sarah Eno (UMD)

11/2004 - 01/2008 **PhD in Physics**
"Search for Supersymmetry with Gauge-Mediated Breaking using high energy photons at CMS experiment" [76]
Advisors: Prof. Shahram Rahatlou, Dott. Daniele del Re (Sapienza)
Sapienza Università di Roma, Rome, Italy

09/1998 - 05/2004 ***Laurea* in Physics** (highest honors)
"Calibration of an electromagnetic calorimeter using the energy flow method" [77]

ADVISORS: Dott. Riccardo Paramatti (INFN), Prof. Egidio Longo (Sapienza)
Mark: 110/110 *"magna cum laude"*
Sapienza Università di Roma, Rome, Italy

Research Grants

08/2013 **Winner of Programma Per Giovani Ricercatori "Rita Levi Montalcini"**
Risultati Bando 2010
Three-year grant of about 220000 euros for research in experimental high-energy physics with the CMS detector at the CERN LHC, of which 44000 euros for research costs.

02/2019 **Winner of "Progetti di Ricerca Bando Ateneo Sapienza - Progetti Medi"**
Research project title: "Search for new resonances in unexplored trijet final states at LHC". Three-year grant of 12500 euros for research costs.

Invited Talks at Conferences

29/09/2019 - 04/10/2019 **SCINT2019** - 15th Conference on Scintillating Materials and their Applications, Sendai, Japan *"Precision Timing in the CMS MTD Barrel Timing Layer with Crystal Bars and SiPMs"* [43]

09-13/10/2017 **GGI2017** - Collider Physics and the Cosmos, Galileo Galilei Institute, Arcetri (FI), Italia *"Recent results and future perspectives on searches for dark matter mediators"*

06-14/07/2016 **ICNFP2016** - International Conference on New Frontiers in Physics, Kolymbari, Crete, *"Search for new physics beyond the Standard Model in final states with jets and leptons+jets at CMS"* [44]

02-09/07/2014 **ICHEP2014** - International Conference on High Energy Physics, Valencia, Spain, *"Search for heavy resonances decaying to bosons with the ATLAS and CMS detectors"* [45]

08-10/05/2013 **Workshop LHCpp 2013** - VI Workshop Italiano sulla Fisica p-p a LHC, Genova, Italy, *"Hadronic Resonances at ATLAS and CMS"* [46]

12-15/09/2012 **PIC2012** - XXXII Physics in Collision 2012, Strbske Pleso, Slovakia, *"Exotic Phenomena Searches at Hadron Colliders"* [47]

13-20/03/2011 **Moriond/EW 2011** - Rencontres de Moriond on "EW Interactions and Unified Theories", La Thuile, Italy, *"Exotica Searches at CMS"* [48]

19-23/04/2010 **DIS2010** - XVIII International Workshop on Deep-Inelastic Scattering and Related Subjects, Firenze, Italy, *"Searches With Early Data At CMS"* [49]

15-17/04/2009 **IFAE2009** - Incontri di Fisica delle Alte Energie, VIII Edizione, Bari, Italy,*"Prospects for Exotica Searches at ATLAS and CMS Experiments"* [50]

Review Committees

02/2019 - today Referee of *European Physical Journal C* link to online journal (2018 impact factor = 4.843)

06/2016 - today Referee of *New Journal of Physics* link to online journal (2018 impact factor = 3.783)

2011 - today Chair or member of the internal *"Analysis Review Committees"* for the scrutiny of public results of the CMS collaboration (a selection: [1, 21, 22, 38, 20])

Citation Report

Last updated on 14/06/2020

Total number of publications: 971 inspire link
Total number of publications from 01/01/2015 (last 5 years): 453 inspire link
Total number of citations from 01/01/2010 (last 10 years): 101058 inspire link
Hirsch h index from 01/01/2010 (last 10 years): 148 inspire link
Hirsch h index (ISI database, last 10 years): 99

I'm author of more than 40 internal notes and 8 conference reports of the CMS experiment and 8 articles on detector studies in small collaborations.

Teaching

03/2020 - today **Corso di Laboratorio di Meccanica, Sapienza, Corso di Laurea in Fisica**
Professor of laboratory of mechanics (including lessons of probability and statistics) for physics majors at first year of University

03/2015 - 03/2020 **Corso di Fisica I, Sapienza, Corso di Laurea in Chimica Industriale**
Professor of mechanics and thermodynamics for chemistry majors

03/2018 - 03/2019 **Corso di Statistica, Sapienza, Corso di Laurea in Chimica**
Professor of error analysis and statistics for chemistry majors

03/2017 - 08/2018 **Corso di Physics Laboratory II, Sapienza, Corso di Laurea in Fisica**
Teaching assistant of particle physics laboratory at physics majors

10/2005 - 02/2006 **Corso di Fisica I, Sapienza, Corso di Laurea in Matematica**
Teaching assistant of mechanics at mathematics majors

Academic Responsibilities

09/2019 - today **"Presidente della Commissione per i Prodotti della Ricerca del Dipartimento di Fisica" at Sapienza**
Organization of the activities related to research quality evaluation

10/2014 - 04/2018 **"Referente di Con.Scienze per la Facoltà di SMFN" at Sapienza**
Organization of verification tests required for student registration at first year of University in science faculty

09/2015 - 03/2020 **Member of "Commissione Didattica del CdL in Chimica Industriale" at Sapienza**
Coordination and rationalization of academic activities and teaching programs in undergraduate courses for chemistry majors

Student Supervision

I have been the thesis supervisor or co-supervisor of the following students at Sapienza:

2019-today **Claudio Quaranta (PhD)**, current research activity: *"Search for trijet resonances in the boosted dijet final state"* [52]

2018-2019 **Samuele Torelli (undergraduate)**, *"Study of time resolution and characterization of LYSO crystals for the CMS MTD"* http://www.roma1.infn.it/cms/tesi/torelli.pdf

2016-2017 **Alfonso Tanga (undergraduate)**,*"Ricerca di nuove risonanze in stati finali con tre jet a LHC"* http://www.roma1.infn.it/cms/tesi/tanga.pdf

2015-2017 **Simone Gelli (PhD)**,*"Search for new particles decaying into $Z\gamma/W\gamma$ final states in proton-proton collisions at $\sqrt{s} = 13$ TeV"* http://www.roma1.infn.it/cms/tesi/gelli.pdf

2014-2015 **Giulia D'Imperio (PhD)**, *"Search for narrow resonances in dijet final states at the LHC with $\sqrt{s} = 13$ TeV"* http://www.roma1.infn.it/cms/tesiPHD/dimperio.pdf [7]

During my convenerships of analysis groups and postdoc appointments in the CMS experiment, I supervised the research activity of the following students from different institutions:

2015-2017 **Federico Preiato (PhD)**, Sapienza University of Rome, Italy
"Search for heavy resonances in the dijet final state and jet energy calibration" [6, 54]

2012-2015 **Emine Gurpinar (PhD)**, Cukurova University, Turkey
"Searches for heavy resonances decaying to pair of jets at CMS" [9, 12]

2012-2014 **Shuai Liu (PhD)**, Peking University, China
"Searches for beyond Standard Model WW→ $\ell\nu qq$ resonances at CMS" [13]

2012-2014 **Edmund Berry (PhD)**, Princeton University, USA
"Searches for first-generation leptoquarks at CMS with $\sqrt{s} = 7$ and 8 TeV data" [23, 24]

2010-2011 **Dinko Ferencek (PhD)**, University of Maryland, USA
"Searches for First-Generation Leptoquarks at CMS with early $\sqrt{s} = 7$ TeV data" [25]

2008-2009 **Elizabeth Twedt Lockner (PhD)**, University of Maryland, USA
"Feasibility study of First-Generation Leptoquark searches at CMS" [42]

Scientific Coordination in the CMS experiment

09/2016 - 09/2018 **Coordination of the *CMS Exotica Jets+X Working Group***
This analysis group works on searches for new physics beyond the Standard Model in final states containing jets. The group, constituted by more than 50 physicists working in universities and research institutions from all the world, performs almost 20 physics analyses in this final state. During my convenership, the group produced 9 publications (including [2, 3, 4, 5]) and 3 preliminary results. The results of the remaining searches are expected to be published in 2018.

09/2014 - 09/2016 **Coordination of the *Dijet Resonance Team* of the CMS experiment**
This analysis team works on searches for new massive resonances at the TeV scale decaying

into a pair of jets using the dijet mass spectrum. It is constituted by almost 20 physicists from several institutions from all the world. This group produced two high-impact papers using proton-proton collisions at $\sqrt{s} = 13$ TeV [6, 7], including the first published limits in the dijet final state on the mass of a mediator of the interaction between dark matter and standard model particles.

01/2013 - 01/2015 **Coordination of the *CMS Exotica Leptons+Jets Working Group***
This analysis group works on searches for new physics beyond the Standard Model in final states containing leptons and jets. The group, constituted by more than 50 physicists working in universities and research institutions from all the world, performed about 15 physics analyses in this final state. During my convenership, the group produced 3 publications [18, 19, 13] and 7 preliminary results that were then published or submitted for publication in 2015 (including [16, 17, 23]).

03/2012 - 03/2013 **Coordination of the *Dataset Definition Team* of the CMS experiment**
Definition of the trigger requirements forming the data streams used for physics analysis and detector calibration. This responsibility also consists in the design and implementation of a novel strategy for *data parking* and *data scouting* [39]. LHC searches for new particles with sub-TeV masses are hindered by the high thresholds required to limit trigger rates. The new technique of data scouting, based on online event reconstruction and small record sizes, allows to lower trigger thresholds and extend searches for new particles into hitherto unexplored regions.

09/2008 - 09/2010 **Coordination of the *Prompt Feedback Group* of the hadronic calorimeter of the CMS experiment (HCAL)**
Monitoring and data analysis concerning problems in the detector during cosmic-ray data-taking. The group was formed by almost 10 students and postdocs working on HCAL detector studies in early data taking periods.

Highlights of Research Activities in the CMS experiment

09/2017 - today Responsible in the CMS Rome group for the laboratory activities on characterization of LYSO scintillating crystals for the Barrel Timing Layer (BTL) detector of the CMS experiment (Phase II upgrade) [37]. The precision time information of BTL (30-50 ps resolution) will reduce the effects of the high pile-up expected at the HL-LHC and bring new and unique capabilities to the CMS detector in identification of low energy charged particle and search for new long-lived particles predicted by theories beyond the standard model. The technology selected for the BTL consists of scintillating crystal of Lutetium Yttrium Orthosilicate doped with Cerium (LYSO:Ce) arranged in arrays of small elongated bars read out by Silicon PhotoMultipliers (SiPMs). The main goal of this activity is the definition and implementation of the procedures for the quality assurance and control tests of the crystals during the initial market survey phase in 2019-2020 [51] and the final production phase in 2021-2022.

03/2014 - 09/2017 Investigation of use of Micro Channel Plates (MCPs) detectors for precision timing measurements at future colliders. I have been involved in studies on the ionization-MCP (i-MCP) where the avalanche formation is triggered by secondary emission of electrons directly on the MCP surface, when this is hit by relativistic charged particles. The advantage consists in the elimination of the photo-cathode, improving the radiation tolerance of the device. The demonstration of the i-MCP concept has been achieved on both commercial devices and bare MCPs tested inside a custom vacuum chamber designed in Rome. In some config-

urations, detection efficiencies to single particles up to 90% are reached with time resolution between 20 ps and 30 ps [32, 33, 34, 35, 36]. For the BTL detector, the LYSO:SiPM solution was preferred over the novel i-MCP technology because of the time and cost constrains of the CMS upgrade project.

09/2018 - today Leading author of a search for new resonances in unexplored trijet final states at LHC [52]. These particles are predicted in theories that foresee the existence of heavy partners of SM quarks or the existence of extra spatial dimensions. The signal benchmark model is the production of a new resonance (R1) which decays to a quark/gluon and a second resonance (R2), which in turn decays to two quarks/gluons. I plan to explore the impact of modern data science technologies, such as deep learning, in jet substructure identification, in order to boost the sensitivity of this search to new physics signals.

09/2011 - 09/2018 Leading author of searches for resonances at TeV mass scale decaying into a pair of jets (dijet) using the dijet mass spectrum in proton-proton collisions at $\sqrt{s}$ =7 TeV [12, 63], 8 TeV [10, 62, 9, 61], and 13 TeV [6, 55, 7, 57, 56] with the CMS detector. The search for new dijet resonances is among the most important ones at LHC because any hypothetical new particle that might be produced originates from the colliding protons and therefore it must couple to quarks and/or gluons. This search is sensitive to the presence of a hypothetical, massive mediator of the interaction between dark matter and standard model quarks. These papers received in total more than 500 citations.

01/2015 - 09/2018 Study of jet energy calibration using γ+jet events [54] and study jet substructure observables using energetic W bosons in events with top quark pair production [53]. The detailed understanding of both the energy scale and resolution of the jets is of crucial importance for many physics analyses. Jet substructure observables are important in several searches for new physics to identify energetic W or Z bosons decaying to a pair of collimated quarks and reconstructed as single massive jets in the detector.

09/2011 - 09/2018 Proponent of a novel trigger, data acquisition, and analysis strategy to recover sensitivity to new dijet resonances at dijet masses below 1 TeV [39] (*data scouting*). Leading author of searches for dijet resonances using the data scouting technique at $\sqrt{s}$ = 7 TeV [40] and $\sqrt{s}$ = 8 TeV [8, 58]. Supervision of PhD student at Sapienza working on calibration of online reconstructed jets for the scouting analysis at $\sqrt{s}$ = 13 TeV [6, 55]. It is important to extend the dijet search in the mass region below 1 TeV in order to probe hypothetical hadronic resonances with small couplings to quarks and gluons that similar searches performed at previous colliders could not find yet.

12/2011 - 09/2014 Primary author of searches for heavy resonances decaying to WW / ZZ / WZ / qW / qZ in semi-leptonic $\ell\nu q\bar{q}'$ / $\ell\ell q\bar{q}$ [13, 59, 60] and fully hadronic [14, 64, 15, 65] final states at CMS using jet substructure techniques to identify the hadronic decays of boosted vector bosons. The investigation of the di-boson production at high center-of-mass energy is a necessary ingredient for the understanding of the origin of the electroweak symmetry breaking and to disentangle the nature of the Higgs boson.

12/2007 - 12/2014 Leading author of searches for pair production of first generation scalar Leptoquarks (LQ) in the decay channels $LQ\overline{LQ} \to eeqq$ [26, 42, 69, 70] and $LQ\overline{LQ} \to e\nu qq$ [25, 68] with the CMS detector using the first 36 pb^{-1} of LHC collisions at $\sqrt{s}$ =7 TeV. Primary author of the LQ analysis updates with full dataset at $\sqrt{s}$ =7 TeV [24, 67] and author of the 8 TeV analysis [23, 66]. These searches are sensitive to signals from Supersymmetry models with R-Parity violation that foresee stop$\to eq$ decays.

11/2009 - 09/2010 Commissioning of missing transverse energy (MET) reconstructed with the first proton-proton (pp) collisions at $\sqrt{s}$ =0.9 and 2.36 TeV collected by the CMS experiment [41, 71, 72].

11/2009 - 09/2010 Development and implementation of algorithms for the identification of anomalous, beam-induced signals in the CMS hadronic forward calorimeter at $\sqrt{s}$ =0.9, 2.36 and 7 TeV [73, 28].

06/2009 - 07/2009 Commissioning and calibration of the *"delay wire chambers"* used for beam position measurements during the test beam of the hadronic calorimeter (HCAL) of the CMS experiment in 2009 [27].

01/2008 - 07/2008 Commissioning of the hadronic calorimeter of the CMS experiment: expert "on-call" for trigger and data acquisition operations during early cosmic-ray data-taking.

12/2006 - 12/2007 Feasibility study of the search for Gauge Mediated Supersymmetry Breaking models in the prompt photon decay channel $pp \to \tilde{\chi}_1^0\tilde{\chi}_1^0 + X \to \tilde{G}\tilde{G}\gamma\gamma + X$ [76], with simulation of the CMS detector.

07/2006 - 11/2006 Monitoring of the high voltage system of the CMS electromagnetic calorimeter (ECAL) and data-taking shifts in the combined ECAL+HCAL test beam in 2006 [29].

03/2006 - 11/2006 Analysis and test of stability of ECAL high voltage system [31].

10/2005 - 10/2006 Feasibility study of the calibration of the CMS ECAL using $\pi^0 \to \gamma\gamma$ decays [30, 74, 75].

References

Publications (quoted in this document)

[1] A. M. Sirunyan *et al.* [CMS], "Search for dijet resonances using events with three jets in proton-proton collisions at $\sqrt{s} = 13$ TeV,", Phys. Lett. B **805**, 135448 (2020), arXiv:1911.03761 [hep-ex].
I was the chair of the Analysis Review Committee of this CMS publication.

[2] A. M. Sirunyan *et al.* [CMS Collaboration], "Search for narrow and broad dijet resonances in proton-proton collisions at $\sqrt{s} = 13$ TeV and constraints on dark matter mediators and other new particles,", JHEP **08**, 130 (2018), arXiv:1806.00843 [hep-ex].
The analysis was reviewed within the "CMS Exotica jets+X working group" during the period of my convenership.

[3] [CMS Collaboration], "Search for low mass vector resonances decaying into quark-antiquark pairs in proton-proton collisions at $\sqrt{s} = 13$ TeV," JHEP 1801, 097 (2018), arXiv:1710.00159 [hep-ex].
The analysis was reviewed within the "CMS Exotica jets+X working group" during the period of my convenership.

[4] [CMS Collaboration], "Search for a singly produced third-generation scalar leptoquark decaying to a τ lepton and a bottom quark in proton-proton collisions at $\sqrt{s} = 13$ TeV,", Submitted to JHEP, arXiv:1806.03472 [hep-ex].
The analysis was reviewed within the "CMS Exotica jets+X working group" during the period of my convenership.

[5] [CMS Collaboration], "Search for a heavy right-handed W boson and a heavy neutrino in events with two same-flavor leptons and two jets at $\sqrt{s} = 13$ TeV,", JHEP 1805, 148 (2018), [arXiv:1803.11116 [hep-ex].
The analysis was reviewed within the "CMS Exotica jets+X working group" during the period of my convenership.

[6] [CMS Collaboration], "Search for dijet resonances in proton-proton collisions at sqrt(s) = 13 TeV and constraints on dark matter and other models,"
Phys. Lett. B 769, 520 (2017), Erratum: [Phys. Lett. B 772, 882 (2017)], arXiv:1611.03568 [hep-ex].
I'm co-coordinator of the analysis team that produced this CMS paper.

[7] [CMS Collaboration]. "Search for narrow resonances decaying to dijets in proton proton collisions at $\sqrt{s} = 13$ TeV"
Phys. Rev. Lett. 116, 071801 (2016), arXiv:1512.01224 [hep-ex].
I'm co-coordinator of the analysis team that produced this CMS paper.

[8] [CMS Collaboration], "Search for narrow resonances in dijet final states at $\sqrt{s} = 8$ TeV with the novel CMS technique of data scouting"
Phys. Rev. Lett. 117, 031802 (2016), arXiv:1604.08907 [hep-ex].
I'm one of the two main authors and the editor of this CMS paper based on collision data.

[9] [CMS Collaboration], "Search for resonances and quantum black holes using dijet mass spectra in proton-proton collisions at $\sqrt{s} = 8$ TeV"
Phys. Rev. D 91, no. 5, 052009 (2015), arXiv:1501.04198 [hep-ex].
I'm the contact person and the main editor of this public CMS document. I supervised the main analyst working on this search (a PhD student from Cukurova University, Turkey).

[10] [CMS Collaboration], "Search for narrow resonances using the dijet mass spectrum in pp collisions at $\sqrt{s} = 8$ TeV"
Phys. Rev. D 87, no. 11, 114015 (2013), arXiv:1302.4794 [hep-ex].
I am the contact person of this CMS paper based on collision data. I supervised one of the two analysts working on this search (a PhD student from Cukurova University, Turkey).

[11] [CMS Collaboration], "Search for $Z\gamma$ resonances using leptonic and hadronic final states in proton-proton collisions at $\sqrt{s} = 13$ TeV,", arXiv:1712.03143 [hep-ex].
I supervised Simone Gelli who contributed to this publication for his PhD thesis.

[12] [CMS Collaboration], "Search for narrow resonances and quantum black holes in inclusive and b-tagged dijet mass spectra from pp collisions at $\sqrt{s} = 7$ TeV"
JHEP 1301, 013 (2013) arXiv:1210.2387 [hep-ex].
I am one of two analysts of the inclusive dijet search reported in this CMS paper based on collision data.

[13] [CMS Collaboration], "Search for massive resonances decaying into pairs of boosted bosons in semi-leptonic final states at $\sqrt{s} = 8$ TeV"
JHEP 1408, 174 (2014), arXiv:1405.3447 [hep-ex].
I am one of the two contact people of this CMS analysis based on collision data, and co-editor of this CMS paper.

[14] [CMS Collaboration], "Search for massive resonances in dijet systems containing jets tagged as W or Z boson decays in pp collisions at $\sqrt{s} = 8$ TeV"
JHEP 1408, 173 (2014), arXiv:1405.1994 [hep-ex].
I'm part of the analysis group involved in this CMS search which is constituted by almost 10 people from CERN, John Hopkins University, and *L'Institut de Physique Nucleaire de Lyon* (IPNL).

[15] [CMS Collaboration], "Search for heavy resonances in the W/Z-tagged dijet mass spectrum in pp collisions at 7 TeV"
Phys. Lett. B 723, 280 (2013), arXiv:1212.1910 [hep-ex].
I'm part of the analysis group involved in this CMS search which is constituted by almost 10 people from CERN, John Hopkins University, and *L'Institut de Physique Nucleaire de Lyon* (IPNL).

[16] [CMS Collaboration], "Search for massive WH resonances decaying into the $\ell\nu b\bar{b}$ final state at $\sqrt{s} = 8$ TeV"
Eur. Phys. J. C 76, 237 (2016), arXiv:1601.06431 [hep-ex].
The analysis was reviewed within the "CMS Exotica leptons+jets working group" during the period of my convenership.

[17] [CMS Collaboration], "Search for narrow high-mass resonances in proton–proton collisions at $\sqrt{s} = 8$ TeV decaying to a Z and a Higgs boson"
Phys. Lett. B 748, 255 (2015), arXiv:1502.04994 [hep-ex].
The analysis was reviewed within the "CMS Exotica leptons+jets working group" during the period of my convenership.

[18] [CMS Collaboration], "Search for pair production of third-generation scalar leptoquarks and top squarks in proton–proton collisions at $\sqrt{s} = 8$ TeV"
Phys. Lett. B 739, 229 (2014), arXiv:1408.0806 [hep-ex].
The analysis was reviewed within the "CMS Exotica leptons+jets working group" during the period of my convenership.

[19] [CMS Collaboration], "Search for heavy neutrinos and W bosons with right-handed couplings in proton-proton collisions at $\sqrt{s} = 8$ TeV"
Eur. Phys. J. C 74, no. 11, 3149 (2014), arXiv:1407.3683 [hep-ex].
The analysis was reviewed within the "CMS Exotica leptons+jets working group" during the period of my convenership.

[20] [CMS Collaboration], "Search for a massive resonance decaying into a Higgs boson and a W or Z boson in hadronic final states in proton-proton collisions at $\sqrt{s} = 8$ TeV"
JHEP 1602, 145 (2016), arXiv:1506.01443 [hep-ex].
I was member of the *"Analysis Review Committee"* for the scrutiny of this analysis within the CMS collaboration.

[21] [CMS Collaboration], "Search for exotic resonances decaying into WZ/ZZ in pp collisions at $\sqrt{s} = 7$ TeV"
JHEP 1302, 036 (2013), arXiv:1211.5779 [hep-ex].
I was member of the *"Analysis Review Committee"* for the scrutiny of the ZZ search in jet plus missing transverse energy final state within the CMS collaboration.

[22] [CMS Collaboration], "Measurement of the $t\bar{t}$ production cross section in the all-jet final state in pp collisions at $\sqrt{s} = 7$ TeV"
JHEP 1305, 065 (2013), arXiv:1302.0508 [hep-ex].

I was member of the *"Analysis Review Committee"* for the scrutiny of this analysis within the CMS collaboration.

[23] [CMS Collaboration], "Search for pair production of first and second generation leptoquarks in proton-proton collisions at $\sqrt{s} = 8$ TeV"
Phys. Rev. D 93, 032004 (2016), arXiv:1509.03744 [hep-ex].
I supervised the main analyst (a PhD student from Princeton University) of the first-generation search included in this CMS paper based on collision data.

[24] [CMS Collaboration], "Search for pair production of first- and second-generation scalar leptoquarks in pp collisions at $\sqrt{s} = 7$ TeV"
Phys. Rev. D 86, 052013 (2012), arXiv:1207.5406 [hep-ex].
I supervised the main analyst (a PhD student from Princeton University) of the first-generation search included in this CMS paper based on collision data.

[25] [CMS Collaboration], "Search for First Generation Scalar Leptoquarks in the evjj channel in pp collisions at sqrt(s) = 7 TeV"
Phys. Lett. B 703, 246 (2011), arXiv:1105.5237 [hep-ex].
I am the contact person and one of the two analysts (from University of Maryland group) of this CMS paper based on collision data.

[26] [CMS Collaboration], "Search for Pair Production of First-Generation Scalar Leptoquarks in pp Collisions at sqrt(s) = 7 TeV"
Phys. Rev. Lett. 106, 201802 (2011), arXiv:1012.4031 [hep-ex].
I am one of the four analysts (from University of Maryland group) of this CMS paper based on collision data.

[27] [CMS HCAL Collaboration], "Study of various photomultiplier tubes with muon beams and Cherenkov light produced in electron showers"
JINST 5, P06002 (2010).
The data used in this study were collected during the HCAL Test Beam 2009. I contributed to commissioning and calibration of the *"delay wire chambers"* installed along the H2 beam line (CERN, Prevessin site) for beam position measurements.

[28] [CMS Collaboration], "Identification and Filtering of Uncharacteristic Noise in the CMS Hadron Calorimeter"
JINST 5, T03014 (2010), arXiv:0911.4881 [physics.ins-det].
I supervised a PhD student at University of Maryland working at the the development and implementation of algorithms for the identification of anomalous, beam-induced signals in the CMS hadronic forward calorimeter at $\sqrt{s}$ =0.9, 2.36 and 7 TeV.

[29] [USCMS Collaboration and ECAL/HCAL Collaboration], "The CMS Barrel Calorimeter Response To Particle Beams From 2-Gev/C To 350-Gev/C"
Eur. Phys. J. C 60, 359 (2009), [Erratum-ibid. C 61, 353 (2009)].
I monitored the high voltage system of the CMS electromagnetic calorimeter (ECAL) and performed data-taking shifts in the combined ECAL+HCAL test beam in 2006.

[30] [CMS Electromagnetic Calorimeter Group], "Intercalibration of the barrel electromagnetic calorimeter of the CMS experiment at start-up"
JINST 3, P10007 (2008).
I performed a feasibility study of using $\pi^0 \to \gamma\gamma$ decays for the calibration of the ECAL crystals, with full detector simulation.

[31] [F. Santanastasio *et al.*], "High voltage system for the CMS electromagnetic calorimeter"
Nucl. Instrum. Meth. A 582, 462 (2007).
I performed part of the stability tests on the high voltage boards at CERN laboratory and most of the data analysis.

[32] [F. Santanastasio *et al.*], "Response of microchannel plates to single particles and to electromagnetic showers,"
Nucl. Instrum. Meth. A 797, 216 (2015).
I contributed to the preparation of the experimental setup for the test-beam studies and to the data analysis.

[33] [F. Santanastasio *et al.*], "Response of microchannel plates in ionization mode to single particles and electromagnetic showers," Nucl. Instrum. Meth. A 879, 6 (2018)
I contributed to the data analysis.

[34] [F. Santanastasio *et al.*], "Beam test results on the detection of single particles and electromagnetic showers with microchannel plates," Nucl. Instrum. Meth. A **845**, 471-474 (2017) I contributed to the internal article review.

[35] [F. Santanastasio *et al.*], "A fast timing calorimetric layer using micro-channel plates in ionisation mode," JINST **12**, no.03, C03019 (2017) I contributed to the internal article review.

[36] [F. Santanastasio *et al.*], "Micro-channel plates in ionization mode as a fast timing device for future hadron colliders," JINST **12**, no.08, C08014 (2017) I contributed to the internal article review.

Preliminary results of the CMS Collaboration (quoted in this document)

[37] [CMS Collaboration], "A MIP Timing Detector for the CMS Phase-2 Upgrade"
CMS-TDR-020 (2019) https://cds.cern.ch/record/2667167.
Technical design report of the MIP Timing Detector for the CMS experiment.

[38] [CMS Collaboration], "Search for low-mass pair-produced dijet resonances using jet substructure techniques in proton-proton collisions at a center-of-mass energy of $\sqrt{s} =$ 13 TeV"
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I was chair of the *"Analysis Review Committee"* for the scrutiny of this analysis within the CMS collaboration.

[39] [CMS Collaboration] "Data Parking and Data Scouting at the CMS Experiment" CMS DP-2012/022 (2012) link to pdf.
I'm the editor of this public CMS document.

[40] [CMS Collaboration], "Search for Narrow Resonances using the Dijet Mass Spectrum in pp Collisions at sqrt(s)=7 TeV"
CMS PAS EXO-11-094 (2012) link to pdf.
I am the main developer of the novel trigger, data acquisition, and analysis strategy employed in this search to recover sensitivity to new physics at dijet masses below 1 TeV.

[41] [CMS Collaboration], "Performance of Missing Transverse Energy Reconstruction in sqrt(s)=900 and 2360 GeV pp Collision Data"
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I worked on the section related to calorimeter MET cleaning algorithms and performances.

[42] [CMS Collaboration], "Search for Pair Production of First Generation Scalar Leptoquarks at the CMS Experiment"
CMS PAS EXO-08-010 (2009) link to pdf.
I am co-author and one of the four analysts (from University of Maryland group) of this public CMS Physics Analysis Summary based on MC simulation.

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F. Santanastasio
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F. Santanastasio
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F. Santanastasio and C. Doglioni
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F.Santanastasio
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Prepared for the XXXII Physics in Collision 2012 conference (PIC2012), Strbske Pleso, Slovakia, 12-15 September 2012

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Prepared for 18th International Workshop on Deep Inelastic Scattering and Related Subjects (DIS 2010), Florence, Italy, 19-23 Apr 2010

[50] "Prospects for Exotica Searches at ATLAS and CMS Experiments"
F.Santanastasio
Il Nuovo Cimento Vol.32 C, N.3-4 ncc9484 (2009).
Prepared for Incontri di Fisica delle Alte Energie (IFAE 2009), Bari, Italy, Apr 2009

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[51] "LYSO crystal characterization activities performed in 2019"
F. Santanastasio *et al.*
CMS DN-2020/10 (2020)
I am the main author of the part related to the LYSO:SiPM prototype detector.

[52] "Search for trijet resonances in the boosted dijet final state"
F. Santanastasio *et al.*
CMS AN-19-273 (2019)
I am one of the three authors of this internal note based on analysis of collision data. I supervised Claudio Quaranta (PhD student in Sapienza University of Rome) who is the main analyst.

[53] "Measurement of W-tagging data/MC scale factors using ttbar semi-leptonic events using full 2016 dataset"
F. Santanastasio *et al.*
CMS AN-2017/051 (2017)
I am one of the three authors of this internal note based on analysis of collision data. I supervised Simone Gelli (PhD student in Sapienza University of Rome) who is the main analyst.

[54] "Absolute residual jet energy corrections with γ+jet events at 13 TeV"
F. Santanastasio *et al.*
CMS AN-2016/344 (2016)
I am one of the three authors of this internal note based on analysis of collision data. I supervised Federico Preiato (PhD student in Sapienza University of Rome) who is the main analyst.

[55] "Search for narrow resonances decaying to dijets in pp collisions at $\sqrt{s} = 13$ TeV using 12.9 fb^{-1}"
F. Santanastasio *et al.*
CMS AN-2016/202 (2016)
I am the editor of this internal note. I supervised Federico Preiato (PhD student in Sapienza University of Rome) working on the calibration of online reconstructed jets employed in the scouting analysis.

[56] "Search for narrow resonances using the dijet mass spectrum with 2.45 fb^{-1} of proton-proton collisions at $\sqrt{s} = 13$ TeV"
F. Santanastasio *et al.*
CMS AN-2015/175 (2015)

I am the editor of this internal note presenting results on analysis of collision data. I supervised Giulia D'Imperio (PhD student in Sapienza University of Rome) who is the main analyst.

[57] "Search for narrow resonances using the dijet mass spectrum in proton-proton collisions at sqrt(s)=13 TeV (Phys14 MC analysis)"
F. Santanastasio *et al.*
CMS AN-2015/063 (2015)
I am the editor of this internal note concerning a feasibility study of the dijet search. I supervised Giulia D'Imperio (PhD student in Sapienza University of Rome) who is the main analyst.

[58] "Search for dijet resonances at $\sqrt{s} = 8$ TeV with data scouting"
F. Santanastasio *et al.*
CMS AN-2014/104 (2014)
I am co-editor of this CMS analysis note based on collision data and one of the two main analysts.

[59] "Search for a BSM resonance decaying to W vector bosons in the semileptonic final state"
F. Santanastasio *et al.*
CMS AN-2013/045 (2013)
I am the contact person of this CMS analysis based on collision data and one of the four main analysts. I supervised one of the two main analysts working on this search (a PhD student from Peking University, China). The analysis is has been published in 2014 in combination with a complementary search for ZZ resonances (EXO-12-022).

[60] "Search for a BSM resonance decaying to Z vector bosons in the semileptonic final state"
F. Santanastasio *et al.*
CMS AN-2013/040 (2013)
I'm part of the analysis group involved in this CMS search which is constituted by about 10 people from CERN, KIT, Peking University, SPRACE, and University of Perugia. The analysis has been published in 2014 in combination with a complementary search for WW resonances (EXO-12-021).

[61] "Search for Narrow Resonances using the Dijet Mass Spectrum in pp Collisions at sqrt(s)=8 TeV with full 2012 dataset"
F. Santanastasio *et al.*
CMS AN-2012/455 (2012)
I am the contact person of this CMS analysis based on collision data. I supervised the main analyst working on this search (a PhD student from Cukurova University, Turkey). A public preliminary result has been released by the CMS collaboration on February 2013 in view of the Moriond/EW conference. The analysis is aiming for publication in 2015 in combination with a search for high mass resonances decaying to pairs of b-quarks.

[62] "Search for Narrow Resonances using the Dijet Mass Spectrum in pp Collisions at sqrt(s)=8 TeV"
F. Santanastasio *et al.*
CMS AN-2012/229 (2012)
I am the contact person of this CMS analysis based on collision data. I supervised one of the two analysts working on this search (a PhD student from Cukurova University, Turkey). This analysis has been published in 2013.

[63] "Search for Dijet Resonances in the Dijet Mass Spectrum in pp Collisions at sqrt(s)=7 TeV"
F. Santanastasio *et al.*
CMS AN-2012/012 (2012)
I am one of the two analysts (from a group of about 10 people from various institutions including CERN) of this CMS analysis based on 4.7 fb^{-1} of pp collision data collected in 2011. I am the main developer of the novel trigger, data acquisition, and analysis strategy employed in this search to recover sensitivity to new physics at dijet masses below 1 TeV. This analysis has been published in 2012 in combination with a complementary search for heavy resonances decaying in pairs of b-quarks.

[64] "Search for heavy resonances in the W/Z-tagged dijet mass spectrum in pp collisions at 8 TeV"
F. Santanastasio *et al.*
CMS AN-2012/393 (2013)
I'm part of the analysis group involved in this CMS search which is constituted by almost 10 people from CERN, John Hopkins University, and *L'Institut de Physique Nucleaire de Lyon* (IPNL). This analysis has been published in 2014.

[65] "Search for qW/qZ/WW/WZ/ZZ Resonances in the W/Z-tagged Dijet Mass Spectrum from 7 TeV pp Collisions at CMS"
F. Santanastasio *et al.*
CMS AN-2011/524 (2011)
I'm part of the analysis group involved in this CMS search which is constituted by almost 10 people from CERN, John Hopkins University, and *L'Institut de Physique Nucleaire de Lyon* (IPNL). This analysis has been published in 2013.

[66] "Search for Pair-production of First Generation Scalar Leptoquarks in pp Collisions at sqrt(s)=8 TeV"
F. Santanastasio *et al.*
CMS AN-2013/109 (2013)

[67] "Search for First-Generation Scalar Leptoquarks in pp Collisions at sqrt(s)=7 TeV using the CMS Detector"
F. Santanastasio *et al.*
CMS AN-2011/492 (2011)
I am one of the two analysts (supervising a PhD student from Princeton University) of this CMS analysis based on 4.7 fb^{-1} of pp collision data collected in 2011. This analysis has been published in 2012 in combination with a complementary second-generation leptoquark search.

[68] "Search for Pair Production of First-Generation Scalar Leptoquarks Using Events Produced in pp Collisions at sqrt(s)=7 TeV Containing One Electron, Two Jets and Large Missing Transverse Energy"
F. Santanastasio *et al.*
CMS AN-2010/361 (2010)

[69] "Search for Pair Production of First Generation Leptoquarks Using Events Containing Two Electrons and Two Jets Produced in pp Collisions at sqrt(s)=7 TeV"
F. Santanastasio *et al.*
CMS AN-2010/230 (2010)

[70] "Search for Pair Production of First Generation Scalar Leptoquarks at the CMS Experiment"

F. Santanastasio *et al.*
CMS AN-2008/070 (2009)

[71] "Results of a visual scan of high MET events in 7 TeV pp collision data"
F. Santanastasio *et al.*
CMS AN-2010/219 (2010)

[72] "Commissioning of Uncorrected Missing Transverse Energy in Zero Bias and Minimum Bias Events at sqrt(s)=900 GeV and 2360 GeV"
F. Santanastasio *et al.*
CMS AN-2010/029 (2010)

[73] "Optimization and Performance of HF PMT Hit Cleaning Algorithms Developed Using pp Collision Data at sqrt(s)=0.9, 2.36 and 7 TeV"
F. Santanastasio *et al.*
CMS DN-2010/008 (2010)

[74] "InterCalibration of the CMS Barrel Electromagnetic Calorimeter Using Neutral Pion Decays"
F. Santanastasio *et al.*
CMS DN-2007/013 (2007)

[75] "Study of ECAL calibration with $\pi^0 \to \gamma\gamma$ decays"
F. Santanastasio *et al.*
CMS IN-2006/050 (2006)

Theses (*Laurea* and PhD)

[76] "Search for Supersymmetry with Gauge-Mediated Breaking using high energy photons at CMS experiment"
F. Santanastasio
PhD thesis at *Sapienza Università di Roma* (2007)
http://www.roma1.infn.it/cms/tesiPHD/santanastasio.pdf

[77] "Calibrazione di un calorimetro elettromagnetico tramite il flusso totale di energia"
F. Santanastasio
Laurea thesis at *Sapienza Università di Roma* (2004)
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