LUCA MARSICANO

PERSONAL INFORMATION

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EDUCATION AND CAREER

Istituto Nazionale di Fisica Nucleare (INFN) *Jan. 2026 - present*
Post-doctoral fellow within the NA64 experiment. Research topic: "Experimental activity for the search for light dark matter at particle accelerators, through resonant positron annihilation measurements on atomic electrons".

Istituto Nazionale di Fisica Nucleare (INFN) *Jan. 2022 - Jan. 2026*
Post-doctoral fellow within the ERC "POKER" project. Research topic: "Development of the active thick target for the POKER experiment".

Istituto Nazionale di Fisica Nucleare (INFN) *Jan. 2020 - Jan. 2022*
Post-doctoral fellow, within the "STRONG 2020" project. Research topic: "Hadron spectroscopy of light and heavy quarks".

Università degli Studi di Genova *Nov. 2016 - March. 2020*
Ph.D. Course in Physics, University of Genoa.
Thesis: "The Beam-Dump Experiment". Defense date: 18/03/2020.
Advisors: Dr. Marco Battaglieri, Dr. Andrea Celentano.

Università degli Studi di Genova *Mar. 2014 - Oct. 2016*
Master's Degree in Physics, University of Genoa.
Thesis: "Characterization of a Prototype of the BDX Detector".
Advisors: Dr. Marco Battaglieri, Dr. Andrea Celentano, Dr. Raffaella De Vita. Final Mark: 110/110 cum laude.

Università degli Studi di Genova *Sept. 2009 - Mar. 2014*
Bachelor's Degree in Physics, University of Genoa. Final Mark: 110/110 cum laude.

Liceo Scientifico G.Marconi, Chiavari *Jul. 2009*
High school graduation, Final Mark: 100/100.

RESEARCH ACTIVITY AS POSTODOCTORAL RESEARCHER

2022 - Present: POKER and NA64
POKER (POsitron resonant annihilation into darK mattER) is an ERC-funded project led by Dr. Andrea Celentano from the INFN section in Genoa. Its goal is to perform preliminary measurements with a positron beam to search for light dark matter (LDM), within the framework of the NA64 experiment at CERN, which uses the missing energy technique. In this setup, a high-energy electron or positron beam is directed at an active target (a lead/scintillator electromagnetic calorimeter), where

LDM particles may be produced. Due to their extremely weak interaction with normal matter, LDM particles leave the detector without depositing significant energy, resulting in a missing energy signal—the difference between the beam energy (measured with a magnetic spectrometer) and the energy deposited in the calorimeter. The idea of using positrons stems from studies I conducted during my Ph.D. with Dr. Celentano, which showed that positron resonant annihilation can significantly enhance LDM production in certain mass ranges.

POKER aims to replace the current NA64 target with a new calorimeter made of $PbWO_4$ crystals read out by SiPMs (PKR-cal), optimized for positron beam energies between 40 and 100 GeV. I joined the project as a post-doctoral researcher in January 2022 and since then I have contributed to detector development, data analysis, and Monte Carlo simulations, with both Geant4 and FLUKA. I contributed to the characterization of around 140 crystals for PKR-cal, measuring their light yield, transmission, and radiation hardness. To track radiation damage during beam operation, I also designed and tested a laser monitoring system that injects controlled light pulses into each crystal and measures their response variation over time. The setup was validated at the INFN Genova lab, confirming its stability and utility for the calibration and monitoring of the PKR-cal.

I also took part in building and testing POKERINO, a reduced prototype with 9 crystals, tested at CERN at beamlines H6 and H8. I performed MC simulations to study its energy resolution and saturation effects. Meanwhile, I worked on the full-scale PKR-cal, completed in December 2024 and first tested on beam during summer 2025 (data analysis ongoing).

Since summer 2022, NA64 has carried out several runs with positron beams using the original target. These tests, conducted while waiting for the implementation of the PKR-cal, were a first step towards the validation of the POKER/NA64 positron program. I contributed to the analysis of the data collected in 2022–2024, with beam energies of 70 and 100 GeV and a total of $\sim 4 \times 10^{10}$ positrons, using NA64's official C++ reconstruction code and Geant4 simulations. I improved the calorimeter response model based on experimental data and developed algorithms to reject background events by analyzing the shape of the electromagnetic shower in the calorimeter. These data-driven methods were crucial not only for positron data but also for standard 100 GeV electron runs, the main focus of NA64. In recognition of my work, I was appointed coordinator of the NA64 reconstruction code in 2024.

Alongside detector development and data analysis, I continued my Ph.D.-related phenomenology studies on the Z' boson in the $L_\mu - L_\tau$ scenario, a possible LDM mediator also connected to the muon g-2 anomaly. Despite its dominant coupling to second- and third-generation leptons, this particle can be produced at NA64 through effective couplings induced by muon and tau loops. I used the DMG4 Monte Carlo library—which I extended to include relevant cross-sections for Z' production via both positron and electron beams—to compute NA64's expected signal yields and exclusion limits, demonstrating that the experiment is sensitive to this model even with electron data collected from 2016 to 2023.

2020 - 2022: Hadron Spectroscopy

After defending my Ph.D. thesis in May 2020, I continued my research as a post-doctoral fellow at the INFN section in Genoa, focusing from 2020 to 2022 on meson spectroscopy. I worked within the HaSP (Hadron SPectroscopy) network, part of the European STRONG2020 project. HaSP is an international collaboration aiming to create synergy between various theoretical and experimental efforts in hadron spectroscopy, promoting common methodologies for data analysis, interpretation, and preservation across European and international experiments (CERN, Mainz, Bonn, GSI, CLAS/JLab, TJNAF, BESIII, J-PARC, Belle).

Within HaSP, I joined the CLAS collaboration (CEBAF Large Acceptance Spectrometer) at Jefferson Lab, an experiment that investigates several aspects of hadronic and nuclear physics, such as the structure of nucleons and the production of exotic mesons and baryons. CLAS uses high-energy, high-intensity, and variably polarized electron beams striking fixed targets of hydrogen or heavier nuclei, with final-state particles detected via a large-acceptance spectrometer. During my post-doc, I focused

on several aspects of the experiment: I helped improve the particle tracking algorithms used in data reconstruction and contributed to the energy calibration of the CLAS Forward Tagger, an electromagnetic calorimeter for detecting small-angle electrons. These efforts required strong command of the Geant4-based CLAS Monte Carlo framework and the reconstruction and analysis algorithms developed by the collaboration. This work benefited several ongoing analyses.

I also contributed to physics analyses conducted by the CLAS group at INFN Genoa, particularly focusing on the measurement of meson photoproduction cross sections for the a_2 and f_2 mesons. In parallel, I carried out exploratory studies on using advanced algorithms based on machine learning techniques to perform unfolding on CLAS data, and potentially on other hadronic physics detectors. The core idea was to train a neural network on simulated and reconstructed datasets so that it could learn to correct for instrumental effects like smearing, efficiency losses, and bin migration. These studies, of particular interest within HaSP, were carried out in the A(I)DAPT group (Artificial Intelligence for Data Analysis and Preservation).

Finally, between 2020 and 2022 I created and coordinated the official HaSP website, which served as a platform for sharing progress across the various working groups and fostering collaboration. Overall, this experience gave me the opportunity to enter a new field of physics, work within a medium-sized international collaboration (about 100 members), and strengthen my expertise in advanced analysis and simulation tools.

RESEARCH ACTIVITY DURING PH.D. AND MASTER DEGREE

Throughout both my master's degree and Ph.D., my research activities focused on the Beam Dump eXperiment (BDX), an international project based at Jefferson Lab aimed at searching for light dark matter (LDM) produced via the interaction of a 11 GeV electron beam in a thick target (beam dump). During my master's thesis, I was involved in the design and experimental characterization of the first prototype detector, BDX-proto, which was assembled and tested at the INFN laboratories in Catania. My work included the study of different scintillator materials, the calibration of the detector components with beam tests at the INFN "Laboratori Nazionali del Sud" (Catania, Italy), and the measurement of cosmic ray backgrounds. This experience gave me a solid foundation in the construction and experimental chracterization of particle detectors. During my doctoral studies, I further developed and optimized the design of the full BDX detector, working extensively with Monte Carlo simulations and phenomenological models. I focused in particular on modeling and validating the muon flux, both cosmogenic and produced by the beam interaction in the thick dump target, as well as refining signal selection and background rejection strategies. I was also actively involved in the development of a scaled-down prototype detector called BDX-mini, designed to test the expected performance of the final detector. I had a leading role in the analysis of the data collected by BDX-mini at Jefferson Lab, participating also in the testing of a novel streaming DAQ system developed in collaboration with other INFN groups. This phase of my research deepened my skills in simulation (mainly based on Geant4) and in data analysis tools. In parallel to the experimental work, I carried out phenomenological studies exploring new production mechanisms for dark matter particles in beam dump experiments, focusing on secondary positrons and muons generated within the target. These studies showed that such channels, though often neglected, can significantly enhance the experimental sensitivity to LDM, and provided concrete suggestions for improving future analyses. Finally, I investigated the feasibility of future experiments employing high-energy positron beams, showing that both thin-target and active thick-target configurations could offer promising new avenues for LDM search.

POSITIONS OF RESPONSIBILITY

- September 2024 – ongoing. I am responsible person for the reconstruction software of the NA64 experiment, under the appointment of spokespersons Paolo Crivelli and Sergei Gninenko. As manager of the reconstruction code (C++ based), it is my task to direct its evolution towards an optimal direction for the physics purposes of the experiment, coordinating the efforts of the

collaboration. My work is carried out in collaboration with Renat Dusaev, who is responsible for the optimization of the code from a formal and computational efficiency point of view.

- May 2022 – ongoing. I am responsible person for the POKER Laser Monitoring System, on appointment of the project Principal Investigator Andrea Celentano. The primary purpose of the laser monitoring system is to verify the effect of radiation damage on the POKER calorimeter crystals. My responsibilities include, in addition to the construction and characterization of the system, its operation during the scheduled beam measurements (installation at the line, beam alignment, etc.). I am also responsible for the safety aspects related to the use of class 3B lasers at the CERN experimental facilities, including the design of the laser interlock safety system.
- January 2020 – January 2022: I was responsible for maintaining and coordinating the official website of the HaSP group in STRONG2020 (http://web.ge.infn.it/jstrong2020), which I implemented and kept updated during my period of responsibility.

TALKS AND CONFERENCES

- **Searching for the X17 Particle with the NA64 Experiment at CERN SPS**, *The X17 particle, status and new ideas*, (ECT* Trento, March 24, 2026) - International workshop , oral, plenary.
- **Casting light on the X17 particle with the NA64 experiment at CERN**, IFIC (Instituto de Física Corpuscular) (Valencia, February 10, 2026). - Seminar
- **Missing energy experiments at positron accelerators**, *LDMA2025*, (Genoa, April 10, 2025) - International workshop, oral, plenary.
- **Searching for light Dark Matter with NA64-e and POKER at CERN**, *IFAE2024* (Florence, April 5, 2024) – National conference, oral, plenary.
- **Light Dark Matter search with the NA64-e Experiment at CERN SPS**, *18th Patras Workshop on Axions, WIMPs and WISPs* (Rijeka, July 4, 2023) – International workshop, oral, plenary.
- **Latest results and future prospects of the NA64 experiment at CERN SPS**, *ICHEP2022* (Bologna, July 7, 2022) – International conference, oral, parallel.
- **Opportunities beyond hadron physics: the physics case**, *J-FUTURE* (Online, March 29, 2022) – International workshop, oral, plenary.
- **Overview of the Jefferson Lab experimental program**, *SIF National Congress 2021* (Online, September 16, 2021) – National conference, oral, parallel.
- **Dark Photon Production Via Positron Annihilation In Electron-Beam Thick-Target Experiments**, *721st WE-Heraeus Seminar "Light Dark Matter Searches"* (Online, June 10, 2021) – International workshop, poster, plenary.
- **Searching for Dark Photon with Positrons in Fixed Target Experiments**, *Seminar at the Center of Underground Physics (IBS-CUP)* (Online, December 15, 2020) – International seminar, oral.
- **Streaming readout system for the BDX experiment**, *22nd IEEE Real Time Conference* (Online, October 20, 2020) – International conference, oral, plenary.
- **Light Dark Matter Searches at Electron Beam-Dumps**, *LDMA19* (Venice, November 21, 2019) – International workshop, oral, plenary.
- **The search for dark photons**, *EINN2019* (Paphos, October 31, 2019) – International conference, oral, plenary.

- **Light dark matter searches with special focus on the Beam Dump eXperiment**, *Frontiers and Careers Workshop* (Paphos, October 27, 2019) – International workshop, oral, plenary.
- **Validation of BDX Streaming Readout**, *EIC Streaming Readout IV* (Camogli, May 23, 2019) – International workshop, oral, plenary.
- **The Beam-Dump eXperiment**, *NuInt18* (L'Aquila, October 17, 2018) – International workshop, poster, plenary.
- **The Beam Dump eXperiment at Jefferson Lab**, *SIF National Congress 2018* (Arcavacata di Rende, September 20, 2018) – National conference, oral, parallel.
- **The Beam Dump eXperiment**, *ICHEP2018* (Seoul, July 5, 2018) – International conference, oral, parallel.
- **Searching for Dark Photons with Positrons at JLab**, *JPOS17* (Jefferson Lab, September 14, 2017) – International workshop, oral, plenary.
- **The Beam Dump eXperiment**, *Invisibles17* (Murten, July 7, 2017) – International doctoral school, poster, plenary.

CONFERENCE CHAIRING

- LDMA25: "Light Dark Matter at Accelerators" Genova, Italy 8-11 April 2025. https://agenda.infn.it/event/43758/page/10021-scientific-committees
- STRONG2020: "Second Strong2020 Online Workshop" Virtual, 14-16 September, 2021. https://agenda.infn.it/event/27658/page/5782-scientific-program
- LDMA19: "Light Dark Matter at Accelerators" Venezia, Italy 20-22 November 2019. https://agenda.infn.it/event/18184/page/4565-committees

REVIEW ACTIVITY

- 2025: Reviewed a manuscript submitted to Physical Review D (PRD).
- 2025: Reviewed a manuscript for the Journal of High Energy Physics (JHEP).

ATTENDED SCHOOLS

During my Ph.D. I attended the following schools:

- "Next Frontiers in Dark Matter", Galileo Galilei Institute, Florence, Italy, 16-27 September 2019.
- "Machine Learning" INFN school, Camogli (GE), Italy, 20-22 May 2019.
- "Invisibles17" School, Centre Loewenberg, Murten (Friburgo), Switzerland, 6-10 June 2017.

DIDACTIC EXPERIENCE

- July 12–19, 2024: Delivered four lectures at the "Second School on Dark Matter and Neutrino Detection", organized by ICTP-SAIFR and UNESP in São Paulo, Brazil (`https://www.ictp-saifr.org/ssdmnd2024/`). The school targeted graduate and undergraduate students. The lectures, totaling approximately four hours, provided a phenomenological and experimental overview of current accelerator-based searches for light dark matter.
- November 2021 – April 2025: Supervisor of the Ph.D. thesis "Searching for Light Dark Matter with the NA64-POKER Experiment" by Dr. Pietro Bisio.
- October 2020 – October 2021: Supervisor of the Master's thesis "Search for Light Dark Matter with a Positron Beam at Jefferson Lab" by Dr. Pietro Bisio, awarded with 110/110 cum laude.

- University teaching experience:
  - AY 2020/2021: Teaching assistant for the course "General Physics 1 – Module A" at the University of Genoa, Mechanical Engineering degree program, under Prof. A. Celentano.
  - AY 2019/2020: Teaching assistant for the course "General Physics 1 – Module A" at the University of Genoa, Mechanical Engineering degree program, under Prof. A. Celentano.
  - AY 2018/2019: Teaching assistant for the course "General Physics 1 – Module A" at the University of Genoa, Mechanical Engineering degree program, under Prof. A. Celentano.

OUTREACH

- November 26, 2024: Gave an outreach lecture entitled "Measuring the Flux of Cosmic Muons" during the "International Cosmic Day" at the University of Genoa. Audience: 30 high school students.
- September 9, 2023: Delivered a public talk entitled "Searching for Light and Heavy Dark Matter" at the Festival della Comunicazione in Camogli, in collaboration with Dr. Lea Di Noto. The talk addressed the complementary approaches to dark matter detection, contrasting the WIMP paradigm with that of light dark matter, and focused on the experimental techniques used in both direct detection and accelerator-based searches. Audience: 50 in-person attendees, 300 views via streaming.
  `http://www.festivalcomunicazione.it/incontro-2023-dinoto-marsicano/`
- January 30 – February 2, 2023: Participated as a teaching tutor in the outreach and orientation project "PLS - Scientific Degree Plan" for secondary school students, held at the INFN Genoa Section. Audience: 20 students.
- Since 2023: Member of the OCRA (Outreach Cosmic Ray Activities) collaboration, actively contributing to the annual organization of the International Cosmic Day at the INFN Genoa Section.
- 2019: Author of the article "Alla ricerca di fotoni oscuri con il Beam Dump eXperiment" for the outreach newsletter of the Italian Physical Society.
  https://www.primapagina.sif.it/article/941/il-beam-dump-experiment-una-luce-sul-dark-sector

AWARDS AND PRIZES

- 2026: *Seal of Excellence* for the project *X17 Experiment at North Area* (XENA) submitted to Marie Sklodowska-Curie Action - Postdoctoral Fellowship in 2025.
- 2024: Prize "Miglior contributo nella sessione Frontiera dell'intensità" at IFAE2024.
  `https://agenda.infn.it/event/38127/page/8751-premi`
- 2021: "Honorable Mention" in the context of "Premio Villi 2020" for my PHD thesis "Test and development of the Beam-Dump Experiment at Jefferson Lab".
  `https://web.infn.it/csn3/index.php/it/eventi-2/premio-villi`
- 2018: "Premio per la prima migliore comunicazione nella sezione fisica nucleare e subnucleare al 104° Congresso Nazionale della Società Italiana di Fisica".
  `https://www.sif.it/attivita/congresso/104/comunicazioni`

WHITE PAPERS AND PROPOSALS

1. A. Arza et al., **The COSMIC WISPers White Paper: The physics case for Weakly Interacting Slim Particles**, (2026).
https://arxiv.org/abs/2603.03433

2. The BDX Collaboration - **Dark matter search in a Beam-Dump eXperiment (BDX) at Jefferson Lab: 2018 update to PR12-16-001**, (2018).
https://arxiv.org/abs/1910.03532

3. The BDX Collaboration - **Dark matter search in a Beam-Dump eXperiment (BDX) at Jefferson Lab:an update on PR12-16-001**, (2017) .
https://arxiv.org/abs/1712.01518

4. The BDX Collaboration **Dark matter search in a Beam-Dump eXperiment (BDX) at Jefferson Lab**, (2016).
https://arxiv.org/abs/1607.01390

PUBLICATIONS

1. Yu. M. Andreev, *et al.* - **High efficiency veto hadron calorimeter in the NA64 experiment at CERN**, Nucl. Inst. and Meth. A 1081, 170830 (2026),
https://doi.org/10.1016/j.nima.2025.170830

2. P. H. Adrian et al. (HPS Collaboration) -**First displaced vertex search for electroproduced dark-sector strongly interacting massive particles by the HPS experiment**, Phys. Rev. D 113, 032019 (2026),
https://doi.org/10.1103/2k3q-9mhj

3. A. Antonov, *et al.* - **Proof of principle for a light dark matter search with low-energy positron beams at NA64**, J. High Energ. Phys. 2025, 256 (2025),
https://doi.org/10.1007/JHEP06(2025)256

4. L. Marsicano - **Searching for light Dark Matter with NA64-e and POKER at CERN**, Nuovo Cim.C 48 3, 89 (2025).
http://dx.doi.org/10.1393/ncc/i2025-25089-x

5. A. Marini, et al. - **Status and perspectives of the POKER detector for Dark Sector searches**, Nucl. Inst. and Meth. A 1067, 169677 (2024),
https://doi.org/10.1016/j.nima.2024.169677

6. A. Antonov, et al. - **The POKERINO prototype**, Nucl. Inst. and Meth. A 1066, 169625 (2024), https://doi.org/10.1016/j.nima.2024.169625

7. Yu. M. Andreev, et al. (NA64 Collaboration) - **First constraints on the Lμ-Lτ explanation of the muon g-2 anomaly from NA64-e at CERN**, JHEP 2024, 212 (2024),
https://doi.org/10.1007/JHEP07(2024)212

8. Yu. M. Andreev, et al. (NA64 Collaboration) - **Dark-Sector Search via Pion-Produced η and η' Mesons Decaying Invisibly in the NA64h Detector**, Phys. Rev. Lett. 133, 121803 (2024), https://doi.org/10.1103/PhysRevLett.133.121803

9. B. Banto Oberhauser, et al. - **Development of the fully Geant4 compatible package for the simulation of Dark Matter in fixed target experiments**, Comput. Phys. Commun. 300, 109199 (2024), https://doi.org/10.1016/j.cpc.2024.109199

10. L. Marsicano - **Probing the Dark Sector with NA64 and POKER at CERN SPS**, PoS(COSMICWISPers) 036 (2024), https://doi.org/10.22323/1.454.0036

11. Yu. M. Andreev, et al. (NA64 Collaboration) - **Probing light dark matter with positron beams at NA64**, Phys. Rev. D 109, L031103 (2024), https://doi.org/10.1103/PhysRevD.109.L031103

12. Yu. M. Andreev, et al. (NA64 Collaboration) - **Search for Light Dark Matter with NA64 at CERN**, Phys. Rev. Lett. 131, 161801 (2023), https://doi.org/10.1103/PhysRevLett.131.161801

13. T. Alghamdi, et al. - **Toward a generative modeling analysis of CLAS exclusive 2π photoproduction**, Phys. Rev. D 108, 094030 (2023), https://doi.org/10.1103/PhysRevD.108.094030

14. Yu. M. Andreev, et al. - **Measurement of the intrinsic hadronic contamination in the NA64-e high-purity e+/e- beam at CERN**, Nucl. Inst. and Meth. A 1057, 168776 (2023), https://doi.org/10.1016/j.nima.2023.168776

15. S. Paul, et al. (CLAS Collaboration) - **Alignment of the CLAS12 Central Hybrid Tracker with a Kalman Filter**, Nucl. Inst. and Meth. A 1049, 168032 (2023), https://doi.org/10.1016/j.nima.2023.168032

16. Y. Tian, et al. (CLAS Collaboration) - **Exclusiveπ- Electroproduction off the Neutron in Deuterium in the Resonance Region**, Phys. Rev. C 107, 015201 (2023), https://doi.org/10.1103/PhysRevC.107.015201

17. L. Marsicano - **Latest results and future prospects of the NA64 experiment at CERN SPS**, PoS(ICHEP2022) 174 (2023), https://doi.org/10.22323/1.414.0174

18. P. H. Adrian, et al. - **Searching for prompt and long-lived dark photons in electroproduced e+e- pairs with the heavy photon search experiment at JLab**, Phys. Rev. D 108, 012015 (2023), https://doi.org/10.1103/PhysRevD.108.012015

19. M. Spreafico, et al. - **Performance of BDX-MINI veto systems**, Nucl. Inst. and Meth. A 1048, 167949 (2023), https://doi.org/10.1016/j.nima.2022.167949

20. S. Grazzi, et al. - **A cosmic muon test facility with the MRPC telescopes of the EEE Project**, Nucl. Inst. and Meth. A 1045, 167612 (2023), https://doi.org/10.1016/j.nima.2022.167612

21. M. Battaglieri, et al. - **Dark matter search with the BDX-MINI experiment**, Phys. Rev. D 106, 072011 (2022), https://doi.org/10.1103/PhysRevD.106.072011

22. Yu. M. Andreev, et al. (NA64 collaboration) - **Search for a New B-L Z$'$ Gauge Boson with the NA64 Experiment at CERN**, Phys. Rev. Lett. 129, 161801 (2022), https://doi.org/10.1103/PhysRevLett.129.161801

23. Yu. M. Andreev, et al. (NA64 collaboration) - **Search for a light Z$'$ in the Lμ-Lτ scenario with the NA64-e experiment at CERN**, Phys. Rev. D 106, 032015 (2022), https://doi.org/10.1103/PhysRevD.106.032015

24. D. S. Carman, et al. (CLAS Collaboration) - **Beam-recoil transferred polarization in K+Y electroproduction in the nucleon resonance region with CLAS12**, Phys. Rev. C 105, 065201 (2022), https://doi.org/10.1103/PhysRevC.105.065201

25. N. Zachariou, et al. (CLAS Collaboration) - **Beam-Spin Asymmetry Σ for $\Sigma-$ Hyperon Photoproduction off the Neutron**, Phys. Lett. B 827, 136985 (2022), https://doi.org/10.1016/j.physletb.2022.136985

26. A. Badalà, M. La Cognata, R. Nania, et al. - **Trends in particle and nuclei identification techniques in nuclear physics experiments**, Riv. Nuovo Cim. 45, 189–276 (2022), https://doi.org/10.1007/s40766-021-00028-5

27. E.L. Isupov, et al. (CLAS Collaboration) - **Polarized Structure Function σLT$\prime$ from π0 p Electroproduction Data in the Resonance Region at 0.4< Q2 <1.0 GeV2**, Phys. Rev. C 105, L022201 (2022), https://doi.org/10.1103/PhysRevC.105.L022201

28. S. Diehl, et al. (CLAS Collaboration) - **Multidimensional, High Precision Measurements of Beam Single Spin Asymmetries in Semi-Inclusive $\pi+$ Electroproduction off Protons in the Valence Region**, Phys. Rev. Lett. 128, 062005 (2022), https://doi.org/10.1103/PhysRevLett.128.062005

29. S. Moran, et al. (CLAS Collaboration) - **Measurement of Charged Pion Production in Deep-Inelastic Scattering off Nuclei with the CLAS Detector**, Phys. Rev. C 105, 015201 (2022), https://doi.org/10.1103/PhysRevC.105.015201

30. J. Rowley, et al. (CLAS Collaboration) - **Improved Λp Elastic Scattering Cross Sections Between 0.9 and 2.0 GeV/c and Connections to the Neutron Star Equation of State**, Phys. Rev. Lett. 127, 272303 (2021), https://doi.org/10.1103/PhysRevLett.127.272303

31. P. Chatagnon, et al. (CLAS Collaboration) - **First-time Measurement of Timelike Compton Scattering**, Phys. Rev. Lett. 127, 262501 (2021), https://doi.org/10.1103/PhysRevLett.127.262501

32. M. Khachatryan, et al. (CLAS Collaboration) - **Electron Beam Energy Reconstruction for Neutrino Oscillation Measurements**, Nature 599, 565 (2021), https://doi.org/10.1038/s41586-021-04046-5

33. M. Bondi, et al. - **Fully Geant4 compatible package for the simulation of Dark Matter in fixed target experiments**, Comput. Phys. Commun. 269, 108129 (2021), https://doi.org/10.1016/j.cpc.2021.108129

34. Yu. M. Andreev, et al. (NA64 Collaboration) - **Improved exclusion limit for light dark matter from e+e- annihilation in NA64**, Phys. Rev. D 104, L09170 (2021), https://doi.org/10.1103/PhysRevD.104.L091701

35. M. Battaglieri, et al. - **Light dark matter searches with positrons**, Eur. Phys. J. A 57 (2021) 8, 253, https://doi.org/10.1140/epja/s10050-021-00524-6

36. I. Korover, et al. (CLAS Collaboration) - **12C(e,e'pN) measurements of short range correlations in the tensor-to-scalar interaction transition region**, Phys. Lett. B 820, 136523 (2021), https://doi.org/10.1016/j.physletb.2021.136523

37. N. Zachariou, et al. (CLAS Collaboration) - **Double Polarization Observable G for Single Pion Photoproduction from the Proton**, Phys. Lett. B 817, 136304 (2021), https://doi.org/10.1016/j.physletb.2021.136304

38. X. Zheng, et al. (CLAS Collaboration) - **Measurement of the Proton Spin Structure at Long Distances**, Nature Physics 17, 6 (2021),

https://doi.org/10.1038/s41567-021-01198-z

39. M. Battaglieri, et al. - **The BDX-MINI detector for Light Dark Matter search at Jlab**, Eur. Phys. J. C 81: 164, (2021), https://doi.org/10.1140/epjc/s10052-021-08957-5

40. T.B. Hayward, et al. (CLAS Collaboration) - **Observation of Beam Spin Asymmetries in the Process ep→eπ+π-X with CLAS12**, Phys. Rev. Lett. 126, 152501 (2021), https://doi.org/10.1103/PhysRevLett.126.152501

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