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Postdoctoral Fellow, GSI Helmholtz Centre for Heavy Ion Research

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EXPERIENCE

Postdoctoral Researcher

GSI Helmholtz Centre for Heavy Ion Research

March 2022 - Current Darmstadt, Germany

- Developing a Partial Wave Analysis (PWA) framework for pion-induced reactions at HADES. Built a spin-density matrix elements (SDMEs) analysis framework for dilepton baryonic decays. Built a dynamic coupled-channel fit software for proton-proton reactions (Collaboration with the JuBo group). Supervised Master's thesis and a Bachelor's summer research student. Guest Lecturer: "Detectors and Algorithms for Reconstruction of Charged Tracks" (Winter Semester 2024, Ruhr University Bochum.

Postdoctoral Fellow

Department of Physics, University of Regina

Feb 2021 – Dec 2021 Regina, SK, Canada

- Mentoring students. Apply corrections to the total and differential crosssection of the $\omega\pi^0$ photoproduction. Improve software to simulate and analyze pseudoscalar-vector decay channels in partial waves bases.

Doctoral Candidate

Department of Physics, University of Regina

Sep 2014 – Dec 2020 Regina, SK, Canada

- Extracting total and differential crosssection of the $\omega\pi^0$ photoproduction. Developing software to: monitor gain drifts and radiation damage in Barrel Calorimeter, simulate and analyze the $\omega\pi^0$ decay channel in angular moments and partial waves bases.

Teaching Assistant

Department of Physics, University of Regina

Sep 2014 – Dec 2020 Regina, SK, Canada

- Instructing students in Phys-109 (General Physics I), Phys-119 (General Physics II) labs and Phys-201 (Electricity and Magnetism) Tutorials and labs. Marking lab reports and final exams.

University Teaching Fellow

Department of Physics, University of Regina

Jan 2020 – Feb 2020 Regina, SK, Canada

PUBLICATIONS

- **Partial Wave Analysis for Pion-Induced Resonance Studies in the HADES Experiment**
  Proceedings of Science - FAIRness2024 (Accepted)
- **Measurement of spin-density matrix elements in ϕ(1020)$\rightarrow$ $K^0_S K^0_L$ photoproduction with a linearly polarized photon beam at Eγ= 8.2–8.8 GeV**
  Physical Review C, 112, 2, 025203, (2025).
- **Measurement of Spin-Density Matrix Elements in Δ^{++}(1232) photoproduction**
  Physics Letters B, 139368, (2025).
- **Upper Limit on the Photoproduction Cross Section of the Spin-Exotic π_1(1600)**
  Physical Review Letters, 133, 26, 261903, (2024).
- **Partial Wave Amplitude Analysis in Pion-Induced Reactions at the HADES Experiment**
  EPJ Web of Conferences, 303, 01006, (2024).
- **Measurement of spin-density matrix elements in $\rho(770)$ production with a linearly polarized photon beam at E_γ= 8.2-8.8 GeV**
  Physical Review C, 108, 5, 055204, (2023).
- **Measurement of the J/ψ photoproduction cross section over the full near-threshold kinematic region**
  Physical Review C, 108, 2, 025201, (2023).
- **Search for photoproduction of axion-like particles at GlueX**
  Physical Review D, 105, 5, 052007, (2022).
- **Measurement of Spin Density Matrix Elements in $\Lambda(1520)$ Photoproduction at 8.2-8.8 GeV**
  Physical Review C, 105, 3, 035201, (2022).
- **Measurement of beam asymmetry for $\pi^-\Delta^{++}$ photoproduction on the proton at E_γ= 8.5 GeV**
  Physical Review C, 103, 2, L022201, (2021).
- **The GlueX Beamline and Detector**
  NIM Section A, 987, 164807, (2021).

- Instructing students in Phys-119 (General Physics II) labs and marking lab reports.

Teaching Assistant

Department of Physics, American University in Cairo

Jan 2014 – Jul 2014 | New Cairo, Egypt

- Instructing students during tutorials Phys-211 (Foundations of Modern Physics) and Phys-506 (Advanced Quantum Mechanics). Helping students solving assignment problems. Marking assignments and exams.

Junior Research Fellow

Dzhelepov Laboratory of Nuclear Problems, JINR

Sep – Dec 2013 | Dubna, Russia

- Creating a simulation for an emulsion plate cosmic muon detector in GEANT4. Track reconstruction on emulsion plates for the OPERA experiment.

Teaching Assistant

School of Engineering, Nile University

Jan 2012 – Feb 2013 | Giza, Egypt

- Designing experiments for Phys-101 (General Physics) lab. Instructing students during lab sessions. Invigilating and marking assignments and exams.

EDUCATION

Ph.D. Physics

University of Regina

Sep 2014 – Jan 2021 | Regina, SK, Canada

Thesis title: Photoproduction of the $b_1(1235)$ meson off the proton at E_γ = 6-12 GeV

M.Sc. Nanotechnology

Nile University

Jul 2010 – Aug 2013 | Cairo, Egypt

Thesis title: Investigating Band Gap Energy of Quantum Dot Doped Semiconductors

B.Sc. Physics (Ranked 3rd)

Cairo University

Sep 2006 – Jun 2009 | Giza, Egypt

Graduation Project: Computer Simulation in Physics Using FORTRAN Language

LANGUAGES

Arabic
English
French
German

- **Measurement of the photon beam asymmetry in $\gamma p \to K^+\Sigma^0$ at $E_\gamma = 8.5$ GeV**
  Physical Review C, 101, 6, 065206, (2020).
- **Beam Asymmetry Σ for the Photoproduction of η and $\eta\prime$ Mesons at E_γ = 8.8 GeV**
  Phys. Rev. C, 100, 5, 052201, (2019).
- **First measurement of near-threshold J/ψ exclusive photoproduction off the proton**
  Phys. Rev. let., 123, 7, 072001, (2019).
- **Construction and Performance of the Barrel Electromagnetic Calorimeter for the GlueX Experiment**
  T. D. Beattie, A. M. Foda, C. L. Henschel, et al., NIM Section A, 896, 24-42, (2018).
- **Strange Hadron Spectroscopy with a Secondary K_L Beam at GlueX**
  Proposal for JLab PAC45, PR12-17-001, (2017).
- **Measurement of the beam asymmetry Σ for π^0 and η photoproduction on the proton at E_γ=9 GeV**
  Phys. Rev. C, 95, 042201(R), (2017).
- **First Results from The GlueX Experiment**
  Phys. Rev. C, 95, 042201, (2016).
- **Shapiro and Parametric Resonances in Coupled Josephson Junctions**
  Gaafar, Ma. A.; Shukrinov, Yu. M.; Foda, A. Journal of Physics : Conference Series, (2012).

CONFERENCE TALKS

- **Partial Wave Analysis for Pion-Induced Resonance Studies in the HADES Experiment** Sep, 2024.
  FAIR next generation scientists - 8th Workshop, Croatia.
- **Partial Wave Analysis for Pion-Induced Resonance Studies in the HADES Experiment** July, 2024.
  Exotic Hadron Spectroscopy 2024, Swansea, UK.
- **Partial Wave Analysis for Pion-Induced Resonance Studies in the HADES Experiment** Mar, 2024.
  DPG Spring Meeting, Germany.
- **Partial Wave Analysis for Pion-Induced Resonance Studies in the HADES Experiment** Nov, 2023.
  6^{th} Joint Meeting of the APS-DNP and the Physical Society of Japan, USA.
- **Partial Wave Analysis for Pion-Induced Resonance Studies in the HADES Experiment** Oct, 2023.
  The 16th International Conference on Meson-Nucleon Physics and the Structure of the Nucleon (MENU), Germany.
- **Resonance Regions: Partial Wave Analysis in the HADES Experiment** Mar, 2023.
  DPG Spring Meeting of the Matter and Cosmos Section (SMuK), Germany.