Andrew W. Jackura — *Curriculum Vitae* November 1, 2022

Contact Information

Old Dominion University
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Professional Experience

Adjunct Associate Professor
Old Dominion University — August 2022 to present

Postdoctoral Fellow
Old Dominion University — June 2019 to present

Research Assistant
Indiana University — Jan. 2014 to May 2019

Nuclear Engineering Associate
Argonne National Laboratory — Jan. 2013 to Jan. 2014

Research Aide
Argonne National Laboratory — Aug. 2012 to Jan. 2013

Education

Ph.D., Physics, Indiana University, May 2019

Thesis: *Studies in Multiparticle Scattering Theory*
Adviser: Professor Adam P. Szczepaniak

M.S., Physics, Indiana University, Aug. 2017

B.S., Physics, Purdue University Northwest, May 2013

B.S., Mechanical Engineering, Purdue University Northwest, May 2011

Awards, Fellowships, & Grants

The 2021 Jefferson Science Associates Postdoctoral Prize, $10,000

Konopinkski Dissertation Award, Spring 2019

Outstanding Graduate Student in Research Award, Spring 2019

The Professor Brian D. Serot Fellowhip, Fall 2018

JSA Junior Scientist Travel Award, 2017, 2018, and 2019

Papers in preprint

[1] R. A. Briceño, A. W. Jackura, A. Rodas and J. V. Guerrero, *Prospects for $\gamma^\star\gamma^\star \to \pi\pi$ via lattice QCD,* [arXiv:2210.08051 [hep-lat]].

[2] A. W. Jackura, *Three-body scattering and quantization conditions from S matrix unitarity,* [arXiv:2208.10587 [hep-lat]].

Refereed Journal Publications

[3] K. H. Sherman, F. G. Ortega-Gama, R. A. Briceño and A. W. Jackura, *Two-current transition amplitudes with two-body final states,* Phys. Rev. D **105**, no.11, 114510 (2022)

[4] R. A. Briceño, A. W. Jackura, F. G. Ortega-Gama and K. H. Sherman, *On-shell representations of two-body transition amplitudes: single external current,* Phys. Rev. D **103**, no.11, 114512 (2021)

[5] A. W. Jackura, R. A. Briceño, S. M. Dawid, M. H. E. Islam and C. McCarty, *Solving relativistic three-body integral equations in the presence of bound states,* Phys. Rev. D **104**, no.1, 014507 (2021)

[6] R. A. Briceño, M. T. Hansen and A. W. Jackura, *Consistency checks for two-body finite-volume matrix elements: II. Perturbative systems,* Phys. Rev. D **101**, no.9, 094508 (2020)

[7] R. A. Briceño, M. T. Hansen and A. W. Jackura, *Consistency checks for two-body finite-volume matrix elements: I. Conserved currents and bound states,* Phys. Rev. D **100**, no. 11, 114505 (2019)

[8] V. Mathieu *et al.* [JPAC Collaboration], *Moments of angular distribution and beam asymmetries in $\eta\pi^0$ photoproduction at GlueX,* Phys. Rev. D **100**, no. 5, 054017 (2019)

[9] A. W. Jackura *et al.* [JPAC Collaboration], *Equivalence of three-particle scattering formalisms,* Phys. Rev. D **100**, no. 3, 034508 (2019)

[10] M. Mikhasenko *et al.* [JPAC Collaboration], *Three-body scattering: Ladders and Resonances,* JHEP **1908**, 080 (2019)

[11] C. Fernández-Ramírez *et al.* [JPAC Collaboration], *Interpretation of the LHCb $P_c(4312)^+$ Signal,* Phys. Rev. Lett. **123**, no. 9, 092001 (2019)

[12] A. Rodas *et al.* [JPAC Collaboration], *Determination of the pole position of the lightest hybrid meson candidate,* Phys. Rev. Lett. **122**, no. 4, 042002 (2019)

[13] M. Mikhasenko *et al.* [JPAC Collaboration], *Pole position of the $a_1(1260)$ from τ-decay,* Phys. Rev. D **98**, no. 9, 096021 (2018)

[14] A. Jackura *et al.* [JPAC Collaboration], *Phenomenology of Relativistic $3 \to 3$ Reaction Amplitudes within the Isobar Approximation,* Eur. Phys. J. C **79**, no. 1, 56 (2019)

[15] J. A. Silva-Castro *et al.* [JPAC Collaboration], *Regge phenomenology of the N^* and Δ^* poles,* Phys. Rev. D **99**, no. 3, 034003 (2019)

[16] V. Mathieu *et al.* [JPAC Collaboration], *Structure of Pion Photoproduction Amplitudes,* Phys. Rev. D **98**, no. 1, 014041 (2018)

[17] J. Nys *et al.* [JPAC Collaboration], *Global analysis of charge exchange meson production at high energies,* Phys. Rev. D **98**, no. 3, 034020 (2018)

[18] A. Pilloni *et al.* [JPAC Collaboration], *What is the right formalism to search for resonances? II. The pentaquark chain,* Eur. Phys. J. C **78**, no. 9, 727 (2018)

[19] M. Albaladejo *et al.* [JPAC Collaboration], *Khuri–Treiman equations for $\pi\pi$ scattering,* Eur. Phys. J. C **78**, no. 7, 574 (2018)

[20] V. Mathieu *et al.* [JPAC Collaboration], *Vector Meson Photoproduction with a Linearly Polarized Beam,* Phys. Rev. D **97**, no. 9, 094003 (2018)

[21] M. Mikhasenko *et al.* [JPAC Collaboration], *What is the right formalism to search for resonances?,* Eur. Phys. J. C **78**, no. 3, 229 (2018)

[22] J. Nys *et al.* [JPAC Collaboration], *Features of $\pi\Delta$ Photoproduction at High Energies,* Phys. Lett. B **779**, 77 (2018)

[23] V. Mathieu *et al.*, [JPAC Collaboration], *Analyticity Constraints for Hadron Amplitudes: Going High to Heal Low Energy Issues,* EPL **122**, no. 4, 41001 (2018)

[24] A. Jackura *et al.* [JPAC and COMPASS Collaborations], *New analysis of $\eta\pi$ tensor resonances measured at the COMPASS experiment,* Phys. Lett. B **779**, 464 (2018)

[25] V. Mathieu, J. Nys, C. Fernández-Ramírez, A. Jackura, M. Mikhasenko, A. Pilloni, A. P. Szczepaniak and G. Fox, *On the η and η' Photoproduction Beam Asymmetry at High Energies,* Phys. Lett. B **774**, 362 (2017)

[26] A. Pilloni *et al.* [JPAC Collaboration], *Amplitude analysis and the nature of the $Z_c(3900)$,* Phys. Lett. B **772**, 200 (2017)

[27] J. Nys *et al.* [JPAC Collaboration], *Finite-energy sum rules in eta photoproduction off a nucleon,* Phys. Rev. D **95**, no. 3, 034014 (2017)

[28] A. N. Hiller Blin, C. Fernández-Ramírez, A. Jackura, V. Mathieu, V. I. Mokeev, A. Pilloni and A. P. Szczepaniak, *Studying the $P_c(4450)$ resonance in J/ψ photoproduction off protons,* Phys. Rev. D **94**, no. 3, 034002 (2016)

Whitepapers

[29] M. Albaladejo *et al.* [JPAC], *Snowmass white paper: Need for amplitude analysis in the discovery of new hadrons,* [arXiv:2203.08208 [hep-ph]].

[30] M. Albaladejo *et al.* [JPAC], *Novel approaches in Hadron Spectroscopy,* [arXiv:2112.13436 [hep-ph]].

[31] R. A. Briceño *et al.*, *Issues and Opportunities in Exotic Hadrons,* Chin. Phys. C **40**, no. 4, 042001 (2016)

Conference Proceedings

[32] A. W. Jackura, *Connecting Matrix Elements to Multi-Hadron Form-Factors,* [arXiv:2111.01098 [hep-lat]].

[33] A. W. Jackura, *Matrix Elements of Bound States in a Finite Volume,* PoS **LATTICE2019**, 079 (2019) doi:10.22323/1.363.0079

[34] A. N. Hiller Blin, C. Fernández-Ramírez, A. Jackura, V. Mathieu, V. I. Mokeev, A. Pilloni and A. P. Szczepaniak, *Studying the $P_c(4450)$ resonance in J/ψ photoproduction off protons,* Few Body Syst. **59**, no. 5, 104 (2018)

[35] A. Jackura [JPAC and COMPASS Collaborations], *Tensor resonances in $\eta\pi$ using COMPASS data,* PoS Hadron **2017**, 035 (2018)

[36] M. Mikhasenko, A. Jackura, B. Ketzer and A. Szczepaniak, *Unitarity approach to the mass-dependent fit of 3π resonance production data from the COMPASS experiment,* EPJ Web Conf. **137**, 05017 (2017)

[37] A. Jackura, M. Mikhasenko and A. Szczepaniak, *Amplitude analysis of resonant production in three pions,* EPJ Web Conf. **130**, 05008 (2016)

Invited Talks, Seminars, and Colloquia

[1] *Old Dominion University*, online, April 12, 2022, *Colloquium* "Exotica: Challenges and Opportunities in Hadron Spectroscopy"

[2] *Jefferson Lab*, online, April 11, 2022, *Seminar* "Few-Body Dynamics from QCD"

[3] *Virtual Lattice Field Theory Colloquium Series*, online, February 3, 2022, *Colloquium* "Few-Body Dynamics from the Finite-Volume" [slides][recording]

[4] *TRIUMF*, online, October 27, 2021, *Seminar* "Few-Body Nuclear Phenomena from Lattice Quantum Chromodynamics"

[5] *2021 Jefferson Lab Users Organization Annual Meeting*, online, June 21-23, 2021, *Invited Talk* "JSA Postdoctoral Award Talk – Three-Body Nuclear Phenomena from QCD" [slides]

[6] *Berkeley Lab*, online, November 10, 2020, *Seminar* "Three-body nuclear interactions from QCD" [slides]

[7] *Accessing and Understanding the QCD Spectra*, INT 20-2c, online, August 17 - September 4, 2020, *Invited Talk* "Solving relativistic integral equations for three body systems" [slides].

[8] *MIT*, Cambridge, MA (USA), October 24, 2019, *Seminar* "Finite-Volume Matrix Elements of Two-Hadron States"

[9] *Jefferson Laboratory*, Newport News, VA (USA), October 9, 2019, *Seminar* "Finite-volume matrix elements of two hadron-states" [slides].

[10] *XVI International Workshop on Hadron Structure and Spectroscopy*, Aveiro, Portugal, June 24-26, 2019, *Invited Talk* "Update on JPAC Activities in Hadron Spectroscopy"

[11] *8^{th} Workshop of the APS Topical Group on Hadronic Physics*, Denver, CO (USA), April 10-12, 2019, *Invited Talk* "Towards an Analytical Description of Three Particle Scattering"

[12] *Argonne National Laboratory*, Lemont, IL (USA), January 16, 2019, *Seminar* "Phenomenology of Three Particle Scattering Amplitudes"

[13] *Jefferson Laboratory*, Newport News, VA (USA), October 29, 2018, *Seminar* "Phenomenology of $3 \to 3$ Scattering" [slides].

[14] *International Workshop on Partial Wave Analyses and Advanced Tools for Hadron Spectroscopy (PWA10/ATHOS5)*, IHEP, Beijing (China), July 16-20, 2018, *Invited Talk* "Dispersive approach to three body scattering" [slides].

[15] *The 84^{th} Annual Meeting of the APS Southeastern Section*, Milledgeville, GA (USA), November 16-18, 2017, *Invited Talk* "Hadron Spectroscopy and JPAC Activities"

Conference Talks

[16] *The 9th International Conference on Quarks and Nuclear Physics (QNP2022)*, online, September 5-9, 2022, "Few-Body Dynamics from QCD" [slides]

[17] *14th Conference on the Intersections of Particle and Nuclear Physics (CIPANP)*, August 29-September 4, 2022, "Few-Body Dynamics from QCD" [slides]

[18] *2021 Fall Meeting of the APS Division of Nuclear Physics*, online, October 11-14, 2021, "Progress in relativistic three-hadron scattering from lattice QCD"

[19] *The 38th International Symposium on Lattice Field Theory*, online, July 26-30, 2021, "Connecting Matrix Elements to Multi-Hadron Form-Factors" [slides].

[20] *19th International Conference on Hadron Spectroscopy and Structure (HADRON 2021)*, online, July 26-31, 2021, "Progress in relativistic three-hadron scattering from lattice QCD" [slides].

[21] *9th Workshop of the APS Topical Group on Hadronic Physics*, online, April 13-16, 2021, "Integral equations for relativistic three-hadron scattering" [slides]

[22] *2020 Fall Meeting of the APS Division of Nuclear Physics*, online, October 29-November 1, 2020, "Finite volume relations for two hadron matrix elements and form factors"

[23] *Asia-Pacific Symposium for Lattice Field Theory (APLAT 2020)*, online, August 4-7, 2020, "Connecting Matrix Elements to Multi-Hadron Form-Factors" [slides].

[24] *The 37th International Symposium on Lattice Field Theory*, Wuhan, China, June 16-22, 2019, "Matrix Elements of Bound States in a Finite Volume" [slides].

[25] *Scattering from the Lattice: application to phenomenology and beyond*, Dublin (Ireland), May 14-18, 2018, "Phenomenology of 3-to-3 Scattering" [slides].

[26] *Multi-Hadron Systems from Lattice QCD*, INT, Seattle, WA (USA), February 5-9, 2018, "Dispersive approach to three-particle systems" [slides].

[27] *2nd Workshop on Future Directions in Spectroscopy Analysis*,
Mexico City (Mexico), November 7-11, 2017, "Tensor resonances in $\eta\pi$ production at COMPASS"

[28] *Fall Meeting of the APS Division of Nuclear Physics*, Pittsburgh, PA (USA), October 25-28, 2017, "Peripheral Production of $\eta\pi$ Resonances"

[29] *XVII International Conference on Hadron Spectroscopy (HADRON 2017)*, Salamanca (Spain), September 25-29, 2017, "Tensor Resonances in $\eta\pi$ Using COMPASS Data" [slides].

[30] *4th PIKIO Meeting*,
Lexington, KY (USA), September 16, 2017, "Exotica in Hadron Spectroscopy"

[31] *International Workshop on Partial Wave Analyses and Advanced Tools for Hadron Spectroscopy (PWA9/ATHOS4)*, Bad Honnef (Germany), March 13-17, 2017, "Amplitude analysis for diffractive resonance production" [slides].

[32] *3rd PIKIO Meeting*, Bloomington, IN (USA), March 4$^{\text{th}}$, 2017, "Phenomenological studies on hadronic reactions and resonances extraction"

[33] *7th Workshop of the APS Topical Group on Hadronic Physics*, Washington, D.C. (USA), February 1-3, 2017, "Unitarized amplitudes for diffractive production of three pion resonances"

[34] *2016 Fall Meeting of the APS Division of Nuclear Physics*, Vancouver, BC (Canada), October 13-16, 2016, "Partial wave analysis of 3π with pion and photon beams"

[35] 14th International Workshop on Meson Production, Properties and Interaction (MESON), Kraków (Poland), June 2-7, 2016, "Amplitude analysis of resonant production in three pions" [slides].

[36] *XVI International Conference on Hadron Spectroscopy (HADRON 2015)*, Newport News, VA (USA), September 13-18, 2015, "Amplitude Analysis of Exotic XYZ Quarkonium States" [slides].

[37] *XXVIII Midwest Theory Get-Together*, Argonne National Laboratory, Lemont, IL (USA), September 11-12, 2015, "Amplitude Analysis of Exotic Hadrons"

Posters

[38] *SURA Board of Trustees Meeting*, JLab, Newport News, Virginia (USA), April 25-26, 2018, "Studies of Exotica and the Global Analysis Efforts at JPAC"

[39] *National Nuclear Physics Summer School*, MIT, Cambridge Massachusetts (USA), July 18-29, 2016, "Partial Wave Analysis of 3π Systems"

Teaching Experience

Instructor, Phys226N/231N/261N, University Physics I — Fall 2022

Lecturer, RPI Computational Summer School — Summer 2022

Topics: Hadron Spectroscopy, Scattering Theory, Lattice QCD

Mentor, REYES Nuclear Physics Mentor Program — Fall 2021, Summer 2022

Mentorship program for REYES online program, included 180 students ranging from high school to graduate school educations.

Topics: Quantum Chromodynamics, Scattering theory, Nuclear binding
Lectures were broadcast and saved to the ODU REYES YouTube page [link]

REU Student Supervision,

- Taylor Powell (Old Dominion Univserity). w/ R. Briceño — Summer 2021
  Topic: Solving Relativistic Three-Body Integral Equations in the Presence of Bound States and Resonances
- Ajah Harris (James Madison University). w/ R. Briceño — Summer 2021
  Topic: Studying n-Body Subatomic Reactions using LQCD
- Kevin Saldaña (CSU, Bakersfield). w/ A. Szczepaniak — Summer 2018
  Topic: One Particle Exchange Models in Three Body Scattering

Lecturer, INT Summer School on Problem Solving in Lattice QCD

Topic: Hadron Spectroscopy — June 28-July 16, 2021.

Lecturer, Introduction to Lattice Field Theory (Informal study ODU) — Summer 2020

Lecturer, International Summer School on Reaction Theory — Summer 2017

Topics: Partial wave analysis, Resonances

Associate Instructor, Indiana University

- P410/609 Computational Physics — Fall 2017
- P222 Introductory Physics II — Spring 2015, Spring 2017
- P301 Modern Physics — Fall 2014
- P201 Introductory Physics I — Fall 2013

Lecturer, Argonne National Laboratory, IAEA Training Program

- Education through Experimentation — Fall 2013
- Exercises in Probabilistic Safety Assessment — Fall 2012
- Four (Six) Factor Formula & Neutron Life Cycle — Fall 2012

Substitute Lecturer, Old Dominion University (for R. Briceño)

- PHYS231 University Physics I — Fall 2019

Limited-Term Lecture, Purdue University Northwest

- University Physics II laboratory — Fall 2011- Spring 2013

Summer Schools & Workshops attended

- INT Summer School on Problem Solving in Lattice QCD, online, June 28-July 16, 2021.
- Workshop, Accessing and Understanding the QCD Spectra - INT Workshop INT-20-2c, online, August 17-September 4, 2020.
- Summer school, National Nuclear Physics Summer School MIT, Boston, MA (USA), July 18-19, 2016.
- Worksop, Modern Exotic Hadrons - INT Workshop INT-15-60W Seattle, WA (USA) November 2-13, 2015
- Workshop, Future Directions in Spectroscopy Analysis Jefferson Laboratory, Newport News, VA (USA), November 18-20, 2014.
- Summer school, Hadron Physics Summer School 2014 Forschungszentrum Jülich, (Germany), September 1-5, 2014.
- Summer school, 29th Annual Hampton University Graduate Studies Program Jefferson Lab, Newport News, VA (USA), June 2-20, 2014.
- Conference, Nuclear Structure 2012

Professional Service & Outreach

- *Reviewer*, DiRAC RAC – Particle Physics and Nuclear Theory 13.5 First Assessment Panel
- *Convener*, 22nd edition of Particles and Nuclei International Conference (PANIC) 2021, 5-10 September, 2021.
- *Referee*, Physical Review Letters, Physical Review D, Journal of High-Energy Physics
- *Organizer*, Summer school, 2017 International Summer Workshop on Reaction Theory Indiana University, Bloomington (USA), June 12-22, 2017.
- *Organizer*, Summer school, 2015 International Summer Workshop on Reaction Theory Indiana University, Bloomington (USA), June 8-19, 2015.
- *Organizer*, Particle Theory Journal Club, Indiana University, Fall 2017-Fall 2018
- *Volunteer*, Regional Science Olympiad, Purdue University Calumet, 2010-2013