Phong Q Dang

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RESEARCH INTEREST

My research focuses on modeling the structures and behaviors that atomic nuclei exhibit at low energy. In particular, I am intrigued by how collective and clustering phenomena emerge from the interactions between protons and neutrons, which are the building blocks of nuclei. To trace this emergence from the ground up, I employ first-principles approaches that describe the nucleus directly from realistic inter-nucleon forces, guided by emergent symmetries that organize its low-energy dynamics. My interest also lies in taking maximum advantage of state-of-the-art artificial intelligence, specifically interpretable machine learning techniques, to aid our quest for uncovering hidden features in large databases that were heretofore missing in our understanding of the universe.

HIGHER EDUCATION

Louisiana State University, Baton Rouge, LA, USA — 08/23 — Present
PhD in Physics, advised by Dr. Jerry P. Draayer
Cumulative GPA: 4.26/4.00; Qualifying Exam: passed in 01/24

University of Debrecen, Debrecen, Hungary — 09/20 — 07/23
BSc in Physics, advised by Dr. József Cseh
Cumulative GPA: 4.99/5.00 (with honor)
Thesis Title: *Shape Isomers of α-like Nuclei in terms of the Multiconfigurational Dynamical Symmetry*

EXPERIENCE

Louisiana State University — Baton Rouge, LA, USA
Research Assistant — 08/23 — Present

- *Ab initio* Symmetry Adapted Model of Atomic Nuclei (1 publication): main developer in constructing the theoretical framework and the underlying mathematics, building and benchmarking high-performance codes with external colleagues.
- Symmetry-aware Machine Learning of Nuclear Systematics: project lead in establishing formalism, developing code and collecting data.
- Wigner and Racah Coefficients of $U(4) \supset SU_S(2) \otimes SU_T(2)$ and $SU(3) \supset SO(3)$ (2 publications): main developer in constructing the mathematical methodology, building and benchmarking high-performance codes with external colleagues.

Louisiana State University — Baton Rouge, LA, USA
Teaching Assistant — 08/23 — Present

- PHYS 7411 Graduate Computational Physics: developing curriculum, designing/grading homework assignments and exams.
- PHYS 2411 Undergraduate Computational Physics: designing/grading homework assignments and exams.
- PHYS 2108 Classical Mechanics Laboratory: teaching non-physics majors.
- Tutoring non-physics majors.

Quantum CodeX — Baton Rouge, LA, USA
Graduate Researcher — 02/25 — 05/25

- Perform original research work to develop and apply methods in nuclear structure theory to problems involving fundamental symmetries, and the intersection of science with business needs.

Institute for Nuclear Research ATOMKI — Debrecen, Hungary
Research Assistant — 06/21 — 07/23

- Shape Isomers of α-like Nuclei (1 publication): utilize MUSY code developed by the ATOMKI nuclear theory group to explore stable shapes of atomic nuclei, their clustering phenomena and their collective behavior; collect, fit, and visualize data.
- Orbital Regularity of Planetary Systems and the Symmetries of the Kepler Problem (1 publication): collect, fit, and visualize data from large exo-planetary databases.

EXTRACURRICULAR STUDIES

2026 National Nuclear Physics Summer School — Seattle, WA, USA
School website — 06/26

FRIB-TA Summer School: Emergence of Collective Motion in Atomic Nuclei — East Lansing, MI, USA
School website — 08/25

Open Questions and Research Tools in Nuclear Astrophysics Summer School — Beaver Island, MI, USA
School website — 07/25

Third Frontiers in Nuclear Astrophysics Summer School — Athens, OH, USA
School website — 05/25

2024 National Nuclear Physics Summer School — Bloomington, IN, USA
School website — 07/24

2024 LONI Scientific Computing Bootcamp — Baton Rouge, LA, USA
Python and Fundamentals of Deep Learning by NVIDIA — 06/24

PROJECTS

Machine Learning Applications in Nuclear Physics — Baton Rouge, LA, USA
Lead developer — 01/26 — Present

***Ab initio* Symmetry Adapted Model of Atomic Nuclei** — Baton Rouge, LA, USA
Co-investigator, main developer — 06/24 — Present

Physics Quest 2025 by the American Physical Society — Baton Rouge, LA, USA
LSU Team Leader in Collaboration with Bard College and MIT Teams — Link — 07/24 — 01/25

Wigner and Racah Coefficients of $\mathrm{U}(4) \supset \mathrm{SU_S}(2) \otimes \mathrm{SU_T}(2)$ **and** $\mathrm{SU}(3) \supset \mathrm{SO}(3)$ — Baton Rouge, LA, USA
Main Investigator — 10/23 — 11/24

Orbital Regularity of Planetary Systems and the Symmetries of the Kepler Problem — Debrecen, Hungary
Co-investigator — 06/21 — 12/23

Shape Isomers of α-like Nuclei in terms of the Multiconfigurational Dynamical Symmetry — Debrecen, Hungary
Main Investigator — 06/22 — 04/23

PUBLICATIONS

2026

- Phong Dang, Evander Espinoza, Xiaoliang Wan, Michela Negro, Jerry P. Draayer, Tomáš Dytrych, Daniel Langr, David Kekejian; *Bridging Ab Initio Symmetries and Global Nuclear Masses with Interpretable Neural Networks*, doi: 10.48550/arXiv.2606.28287
- Phong Dang, Daniel Langr, Tomas Dytrych, Jerry P. Draayer and David Kekejian; *Unmasking Hidden Wigner's Symmetry from First Principles*, doi: 10.48550/arXiv.2604.27144

2025

- Eric Burns *et al.*; *White Paper of the 3rd TDAMM Workshop: Multidisciplinary Science in the Multimessenger Era*, arXiv (2025) 2502.03577, doi: 10.48550/arXiv.2502.03577

2024

- Phong Dang, Jerry P. Draayer, Feng Pan, Tomas Dytrych, Daniel Langr, David Kekejian, Kevin S. Becker, and Noah Thompson; *Coupling and Recoupling Coefficients for Wigner's* U(4) *Supermultiplet Symmetry*, The European Physical Journal Plus, vol. 139, pg. 933, Oct. 2024, doi: 10.1140/epjp/s13360-024-05581-6
- Jerry P. Draayer, Feng Pan, and Phong Dang; *Reconsideration of Wigner's Supermultiplet Symmetry*, Physica Scripta, vol. 99, pg. 102002, Oct 2024, doi: 10.1088/1402-4896/ad72af
- Phong Dang, Jerry P. Draayer, Feng Pan, and Kevin S. Becker; *New Procedure for Evaluation of* U(3) *Coupling and Recoupling Coefficients*, The European Physical Journal Plus, vol. 139, pg. 704, Aug 2024, doi: 10.1140/epjp/s13360-024-05501-8

2023

- József Cseh, Phong Dang, Sándor Szilágyi, and Géza Lévai; *Orbital Regularity of Exoplanets and the Symmetries of the Kepler Problem*, Symmetry, vol. 15, no. 12, pg. 2114, Dec 2023, doi: 10.3390/sym15122114
- Phong Dang, Gábor Riczu, and József Cseh; *Shape isomers of α-like nuclei in terms of the multiconfigurational dynamical symmetry*, Physical Review C, vol. 107, no. 4, pg. 044315, Apr 2023, doi: 10.1103/PhysRevC.107.044315

MEETINGS, CONFERENCES AND INVITED TALKS

Low Energy Community Meeting [POSTER] — Argonne National Laboratory, IL, USA
Title: *Bridging Ab Initio Symmetries and Global Nuclear Masses with Interpretable Neural Network* — Link — 08/26

APS, NSBP, AAPT and AAS Advocacy Day [INVITED] — Washington DC, USA
Role: *APS Advocacy Champion from Louisiana* — 07/26

National Nuclear Physics Summer School [TALK] — Seattle, WA, USA
Title: *From First Principles to Machine Learning: Wigner's Symmetry across the Nuclear Chart* — Link — 07/26

Quad Fellowship Graduation Ceremony [INVITED] — Baton Rouge, LA, USA
Title: *Remarks from Southeast Asian Quad Fellow* — 06/26

Quad Fellowship Spring Symposium [TALK] — Baton Rouge, LA, USA
Title: *Assessing AI Readiness of Educational Institutions* — 05/26

APS Global Physics Summit [INVITED] — Denver, CO, USA
Chair: *Nuclear and Hadronic Physics* — Link — 03/26

Talk: *Carrying Strengths across Borders: What I Learned Navigating Grad School as an International Young Scholar* — Link
Panel: *Responding to Proposed U.S. Immigration Changes to Student and Scholar Visa Categories* — Link

APS Global Physics Summit [TALK] Denver, CO, USA
Title: *Dominance of Wigner's Symmetry in Nuclear Interaction and Structure* — Link 03/26

APS Division of Nuclear Physics 2025 Meeting [TALK] Chicago, IL, USA
Title: *Probing Charge-Exchange Symmetry within the Nuclear Shell Model* — Link 10/25

The 36th Midwest Theory Get Together Argonne National Laboratory, IL, USA
Title: *Importance of Wigner's Supermultiplet Symmetry for Nuclear Structure and Dynamics* — Link 09/25

APS Global Physics Summit Anaheim, CA, USA
Title: *Towards a comprehensive 21st Century Next-Gen Symmetry Adapted Model (SAM) ...* — Link 03/25

APS Annual Leadership Meeting and Congressional Visits Day Washington DC, USA
Role: *Representing APS Student Leadership at Louisiana State University and State of Louisiana* — Link 01/25

Southeastern Section of the APS (SESAPS) 2024 Meeting [TALK] Charlotte, NC, USA
Title: *Next-generation Symmetry-adapted Shell Model for Light and Medium Mass Nuclei* — Link 10/24

APS Division of Nuclear Physics 2024 Meeting [TALK] Boston, MA, USA
Title: *Shell Model Theory for Light and Medium Mass Nuclei* — Link 10/24

Symposium in Honor of the 75th Anniversary of the Shell Model [POSTER] Argonne National Laboratory, IL, USA
Title: *Coupling and Recoupling Coefficients for Nuclear Structure Studies* — Link 07/24

APS 2024 April Meeting [TALK] Sacramento, CA, USA
Title: *Construction of* $\mathrm{U}(4) \supset \mathrm{SU_S}(2) \otimes \mathrm{SU_T}(2)$ *Basis States for Nuclear Structure Studies* — Link 04/24

International Workshop "Shapes and Dynamics of Atomic Nuclei: Contemporary Aspects" [TALK] Sofia, Bulgaria
Title: *Shape isomers of alpha-like nuclei* 09/23

Article of the Month at Institute for Nuclear Research [INVITED] Debrecen, Hungary
Title: *Shape isomers of alpha-like nuclei in terms of the multiconfigurational dynamical symmetry* — Link 07/23

The OTDK national student research conference of Hungary [TALK] Veszprém, Hungary
Talk I: *Shape isomers of alpha-like nuclei in terms of the multiconfigurational dynamical symmetry* — Link 04/23
Talk II: *Investigation of Planetary Systems and the Hidden Symmetries of the Kepler Problem*

The TDK institutional student research conference of University of Debrecen [TALK] Debrecen, Hungary
Title: *Shape isomers of alpha-like nuclei in terms of the multiconfigurational dynamical symmetry* 11/22

IV. Scientific Conference of the Colleges of Advanced Studies of University of Debrecen [TALK] Debrecen, Hungary
Title: *Nuclear Binary Reaction Channels of Alpha-like Nuclei* 11/22

The I international student research conference of Faculty of Science and Technology [TALK] Debrecen, Hungary
Title: *Investigation of Planetary Systems and the Hidden Symmetries of the Kepler Problem* 05/22

Research Night by TalentUD program of University of Debrecen [INVITED] Debrecen, Hungary
Title: *Investigation of Planetary Systems and the Hidden Symmetries of the Kepler Problem* 04/22

The TDK institutional student research conference of University of Debrecen [TALK] Debrecen, Hungary
Title: *Investigation of Planetary Systems and the Hidden Symmetries of the Kepler Problem* 11/21

ACHIEVEMENTS

Medallion, Praise Debrecen, Hungary
by *Dean of the Faculty of Science and Technology*, University of Debrecen 07/23

Certificate of Merit Debrecen, Hungary
by *President and Vice President of the Students Union of the University of Debrecen* 07/23

The II prize at the OTDK national student research conference Veszprém, Hungary
by *President of the national academic student council (OTDT)* 04/23

The II prize at the TDK institutional student research conference Debrecen, Hungary
by *President of the academic student council* at the Faculty of Science and Technology 11/22

Dean's Commendation Debrecen, Hungary
by *Dean of the Faculty of Science and Technology*, University of Debrecen 07/22

The I prize at the TDK institutional student research conference Debrecen, Hungary
by *President of the academic student council* at the Faculty of Science and Technology 11/21

FUNDING, GRANTS AND AWARDS

Travel Support (approx. 6,540 USD)
by *APS*, *NSF*, *FRIB*, *IReNA*, *ANL*, etc.

Coates Conference Travel Award (1,200 USD) 05/26
by LSU Physics and Astronomy Department

Quad Fellowship (20,000 USD) 08/25 — 05/26
by *Google, Pratt Foundation, Western Digital* via Institute of International Education

Summer Funding Opportunity for Graduate Students in STEM and Business Programs (5,500 USD) 06/25 — 08/25
by *Shell Oil Company* via LSU Graduate School

Q-Net Symposium (approx. 5,000 USD) 09/24 — 02/25
by *LSU Student Government, LSU Physics & Astronomy Department, APS, LSU Hearn Institute, Quantum CodeX*

Research and Travel Grant (approx. 115,000 HUF) 02/22 — 05/23
by *TalentUD program, University of Debrecen*

Summer Internship (200,000 HUF) 08/21 — 08/22
by *National Research, Development and Innovation Fund of Hungary* via K18 funding scheme with project no. K 128729

Hungaricum Stipendium Scholarship (approx. 3,000,000 HUF + 14,000 USD) 07/20 — 06/23
by *Department for Study in Hungary* and *Ministry of Education and Training of Vietnam*

ACADEMIC SOCIETY MEMBERSHIPS

American Association for the Advancement of Science (AAAS) 09/24 — Present
LSU AI Journal Club 08/24 — Present
Facility for Rare Isotope Beams Theory Alliance (FRIB-TA) 07/24 — Present
American Physical Society (APS) Chapter at Louisiana State University 06/24 — Present
American Physical Society (APS) 10/23 — Present
Sigma Xi 09/24 — 08/25
TalentUD of University of Debrecen 10/21 — 07/23

LEADERSHIP EXPERIENCE

APS Forum on Graduate Student Affairs (FGSA) Washington DC, USA
International Affair Committee Representative 07/25 — Present

University of Debrecen Debrecen, Hungary
Student Ambassador – Continuing as Alumni Ambassador — Statement 11/21 — Present

Astronomy on Tap Baton Rouge, LA, USA
President 05/25 — 06/26

American Physical Society (APS) Baton Rouge, LA, USA
Student Ambassador 12/23 — 05/26

APS Chapter at LSU Baton Rouge, LA, USA
Founder and Chair 06/24 — 05/25

Graduate Student Organization – LSU Physics and Astronomy Department Baton Rouge, LA, USA
Vice President 04/24 — 04/25

International Student Union, Faculty of Science and Technology, University of Debrecen Debrecen, Hungary
President 04/23— 07/23

International Student Union, Faculty of Science and Technology, University of Debrecen Debrecen, Hungary
Vice President of Education 10/21— 04/23

PUBLIC OUTREACH

American Physical Society (APS) Baton Rouge, LA, USA
Advocacy Champion 07/25 — Present

Astronomy on Tap Baton Rouge, LA, USA
Volunteer 10/23 — Present

Saturday Science Baton Rouge, LA, USA
Volunteer 02/24 — 05/25

COMMITTEE SERVICES

LSU AI Journal Club Baton Rouge, LA, USA
Organizing Committee — Link 01/26 — Present

Fields, Atoms and Nuclei (FAN) Seminars at Department of Physics & Astronomy, LSU Baton Rouge, LA, USA
Chair of Organizing Committee 09/25 — Present

Q-Net Symposium at Louisiana State University Baton Rouge, LA, USA
Organizing Committee — Link 06/24 — 02/25

The 3rd Time-domain and Multimessenger Workshop Baton Rouge, LA, USA
Local Organizing Committee — Link 06/24 — 09/24

The II international conference at Faculty of Science and Technology, University of Debrecen — Debrecen, Hungary
Organizing Committee — Link — 02/23 — 05/23

The I international conference at Faculty of Science and Technology, University of Debrecen — Debrecen, Hungary
Organizing Committee — Link — 02/22 — 05/22

MEDIA FEATURES

How science will shape our shared future — Link — 04/26
LSU PhD Candidate Phong Dang selected as a 2025 Quad Fellow — Link — 09/25
IIE Annouces 2025 Quad Fellows — Link 1 and Link 2 — 08/25
Bringing Scientists Together for Quantum Collaboration — Link — 03/25
Physicists make the case for immigration reform and research funding on Capitol Hill — Link — 03/25
PhD Candidates Welcome Guests to the 3rd TDAMM Workshop — Link — 09/24
Reflection on Study at the University of Debrecen — Link — 07/23
NeurotechEU: UD delegation visits Stockholm — Link 1 and Link 2 — 06/23
Second Prize at National Student Research Conference of Hungary — Link — 04/23