Liangyong Wu

Ph.D. Candidate in Particle and Nuclear Physics
Fudan University, Shanghai 200433, China | email@22110200026@m.fudan.edu.cn |
ResearchGate: Wu-Liangyong

Profile

Ph.D. candidate specializing in precision measurement and quantum sensing using polarized noble-gas spin systems. Experienced in both theoretical and experimental studies on exotic spin-dependent interactions, with strong interests in axion physics, Lorentz/CPT violation, and high-precision magnetometry.

Education

Ph.D. in Particle and Nuclear Physics Sep 2022 – Jun 2026 (expected)
Institute of Modern Physics, Fudan University
Advisors: Dr. C. Fu, Dr. H. Yan
Dissertation: *Searching for Exotic Spin-dependent Interactions With Polarized ^{3}He*

M.S. in Nuclear Technology and Applications Sep 2020 – Jun 2022
China Academy of Engineering Physics
Advisor: Dr. H. Yan
Transferred to Ph.D. program during second year.

B.Eng. in Nuclear Science and Technology Sep 2016 – Jun 2020
School of Nuclear Science and Technology, Lanzhou University
Advisor: Dr. B. Li
Thesis: *Design of Optical Detection Scheme for FID NMR Signal in a Polarized ^{3}He System*

Research Interests

- ^{3}He polarization via SEOP and MEOP
- Precision magnetometry with noble-gas and atomic spins
- New physics searches: exotic spin-dependent interactions, ALPs, Lorentz and CPT violation

Research Highlights

- Built ^{3}He polarization systems based on MEOP and SEOP techniques.

- Theoretically studied unparticle-mediated interactions and derived new constraints.
- Set new experimental bounds on ALPs-mediated SP, VA, and AA-type exotic interactions.
- Extended the axion–nucleon coupling g_{aNN} constraints down to the mass region $m_a \sim 10^{-24}$ eV, surpassing the SN1987A limits.
- Discovered and modeled new ^{3}He nuclear spin relaxation mechanisms in MEOP.

Selected Publications

- K.Y. Zhang, L.Y. Wu, H. Yan, "New limits on ultralight axionlike dark matter from reanalyzed data," *Phys. Rev. Lett.* 135 (2025) 131001.
- Y. Wang, L.Y. Wu, K. Zhang, M. Peng, S. Chen, H. Yan, "A Polarized ^{3}He System Based on MEOP," *Sci. China Phys. Mech. Astron.* 67 (2024) 273011.
- L.Y. Wu, K.Y. Zhang, H. Yan, "Exotic Spin-Dependent Interactions through Unparticle Exchange," *J. High Energy Phys.* (2024) 83.
- L.Y. Wu, K.Y. Zhang, M. Peng, J. Gong, H. Yan, "New Limits on Exotic Spin-Dependent Interactions at Astronomical Distances," *Phys. Rev. Lett.* 131 (2023) 091002.
- L.Y. Wu, S.Q. Zhang, B. Li, "Fisher Information for Endohedrally Confined Hydrogen Atom," *Phys. Lett. A* 384 (2020) 126033.
- L.Y. Wu, C. Fu, H. Yan, "Closed-Loop Control of ^{3}He Nuclear Spin Oscillator: Implementation via MEOP", accepted by *Chin. Phys. Lett.*

Technical Skills

Theoretical

Quantum field theory, atomic, molecular, and optical physics, axion models, density matrix formalism, Bloch equations, spin-exchange collisions and metastability-exchange collisions theory.

Experimental

Laser operation, RF plasma discharge, magnetic shielding, optical pumping/detection, lock-in detection, ODMR.
Software: MATLAB, Python, LabVIEW, CAD, PCB design.

Honours & Scholarships

- Outstanding Student Scholarship (Special Award), CAEP, 2024
- China Nuclear Power Scholarship, 2019

- National Scholarship, Ministry of Education, 2017

Conferences & Presentations

- Talk: "Exploring Exotic Spin-dependent Interactions Beyond the Standard Model," 26th International Symposium on Spin Physics (Qingdao, 2025)
- Talk: "Progress in MEOP ^{3}He System," 15th Polarized Neutrons for Condensed-Matter Investigations (Dongguan, 2025)
- Participant, 2nd International Conference on Axion Physics and Experiment (Xi'an, 2023)