

Yulei ZHANG

Curriculum Vitae

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📄 ATLAS Glance Entry

Education

- 2019–2024 **Ph.D. in Experimental Particle Physics**, *Co-supervisor: Prof. Liang Li*, Shanghai Jiao Tong University. Shanghai, China.
Co-supervisor: Dr. Gregorio Bernardi, Université Paris Cité, LABORATOIRE ASTROPARTICULE & COSMOLOGIE, CNRS. Paris, France.
- 2016–2018 **Master of Science in Financial Engineering**, Columbia University. New York, United States
- 2012–2016 **Bachelor of Science in Physics**, Shanghai Jiao Tong University. Shanghai, China

Research Experience since Ph.D.

Di-Higgs

- 2019-present **ATLAS**, $HH \rightarrow WW, ZZ, \tau\tau \rightarrow \text{multilepton}$, *Unblinding Approved, Submission Pending*.
Internal note editor. Presented Editorial Board talk and unblinding approval request talk. The primary analyzer of $HH \rightarrow 3\text{-lepton}$ channel, with machine learning being introduced for the first time, achieved a factor of 2 increments in expected sensitivity.
- 2022-present **ATLAS**, $HH \rightarrow b\bar{b}\tau^+\tau^-$, *Unblinding Approved, Submission Pending*.
In charge of the MVA optimization in $\tau_{had}\tau_{had}$ channel, major improvement over μ_{HH} limits (17%) and constraining the limit scans for both κ_λ (11.9%) and κ_{2V} (19.8%) compared to the previous analysis (2022).
- 2022 **ATLAS**, *Constraints on the Higgs boson self-coupling from single- and double-Higgs production with the ATLAS detector using pp collisions at $\sqrt{s} = 13$ TeV*.
Co-author, first contribution to the combination of di-Higgs workspace.

Beyond the Standard Model

- 2020-present **CEPC**, *Long-lived particle search with a future lepton collider*.
First author of a pending publication. Direct use of raw detector response for analyzing the long-lived particle for the first time using advanced deep learning techniques.
- 2021-2023 **DarkSHINE**, *Dark photon search with a proposed fixed-target experiment*.
Co-first author. A newly proposed electron-on-target experiment searching for dark photon candidate. Competitive sensitivity has been reached, exceeding all known experimental results by several orders of magnitude.

Qualification Task

- 2021-2022 **ATLAS**, *Improvement of photon ID against electron fakes*.
Detailed study on the discrimination power of the shower shapes & topo cluster & ambiguity (tracking) variables currently used in the photon ID to improve the discrimination of the photon identification criteria against electrons.

Publications

- 2024 Yulei Zhang et al. Search for Long-lived Particles at Future Lepton Colliders Using Deep Learning Techniques, 2024. arXiv:2401.05094 [hep-ex].

- 2023 Yulei Zhang et al. Prospective study of light dark matter search with a newly proposed DarkSHINE experiment. *Sci. China Phys. Mech. Astron.*, page 211062, 2023.
- 2023 Zejia Lu, Yulei Zhang, et al. Application of Graph Neural Networks in Dark Photon Search with Visible Decays at Future Beam Dump Experiment. In *Proceedings of the International Conference on Computer Information Systems and Industrial Applications (IC 2023), Communications in Computer and Information Science (CCIS) 2036*. Springer Nature, 2023.
- 2023 The ATLAS Collaboration. Constraints on the Higgs boson self-coupling from single- and double-Higgs production with the ATLAS detector using pp collisions at $\sqrt{s}=13$ TeV. *Physics Letters B*, volume 843, page 137745, 2023.
- 2023 Yulei Zhang and et al. Search for the non-resonant $HH \rightarrow b\bar{b}\tau^+\tau^-$ process via gluon-gluon and vector-boson fusion production modes using proton-proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector. ATL-COM-PHYS-2023-043 (Internal Note), CERN, Geneva, 2023.
- 2023 Yulei Zhang and et al. Search for non-resonant Higgs boson pair production in final states with leptons and photons using proton-proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector. ATL-COM-PHYS-2020-229 (Internal Note), CERN, Geneva, 2023.

Presentations

- 2023 Nov. **Initial Results on Higgs Pair Production in Multilepton Channels with the ATLAS Experiment**, *The 9th China LHC Physics Workshop*, Shanghai, China.
- 2023 Nov. **Constraints on Higgs Self-Coupling at the LHC with $\sqrt{s} = 13$ TeV**, *14th Workshop of France China Particle Physics Laboratory*, Zhuhai, China.
- 2023 Oct. **Search for Long-lived Particles at Future Lepton Colliders Using Deep Learning Techniques**, *The 2023 international workshop on the high energy Circular Electron Positron Collider*, Nanjing, China.
- 2023 July **Machine Learning in Track reconstruction at DarkSHINE Experiment**, *Workshop on Computation in Experimental Particle Physics*, Shanghai, China.
- 2022 Sept. **Higgs self-coupling from $HH + H$ combination**, *Workshop Physics ATLAS France*, Paris, France.
- 2022 May **Search for $H \rightarrow LLP$ at CEPC**, *Joint Workshop of the CEPC Physics, Software and New Detector Concept in 2022*, Online.
- 2021 Aug. **Long-lived Particle(LLP) searching at the future collider**, *Higgs potential and BSM opportunity*, Online.
- 2021 April **LLP search at the CEPC**, *Joint Workshop of the CEPC Physics, Software and New Detector Concept*, Yangzhou, China.
- 2020 Nov. **Searching for HH to 3-lepton @ ATLAS**, *Di-Higgs 2020: Opportunities and Challenges*, Shanghai, China.

Rewards

- 2022 **Outstanding Graduate Student [First Grade]**, *Key Laboratory for Particle Astrophysics and Cosmology, Ministry of Education*, Shanghai, China.
- 2016 **Outstanding Graduates**, *Shanghai Jiao Tong University*, Shanghai, China.
- 2015 **Shanghai Municipal Government Scholarship**, *Shanghai Municipal Education Commission*, Shanghai, China.
- 2014, 2015 **Xu-Ji Fan Scholarship**, *Shanghai Jiao Tong University*, Shanghai, China, Top 0.1%.
- 2014 **Merit Student**, *Shanghai Jiao Tong University*, Shanghai, China.