WENJIE WU

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EMPLOYMENT

Postdoctoral scholar *Feb. 2020 - Present*
Department of Physics and Astronomy
University of California, Irvine
Irvine, CA, United States

EDUCATION

Wuhan University *Wuhan, China*
Ph.D. in Particle Physics *Sept. 2014 - Dec. 2019*
Advisor: Prof. Xiang Zhou, Prof. Miao He
Dissertation: Neutrino Oscillation Analysis of the Daya Bay Experiment and Energy Measurement Studies of the JUNO Experiment

Wuhan University *Wuhan, China*
B.S. in Physics *Sept. 2010 - Jun. 2014*

RESEARCH EXPERIENCE

NOvA 2020 - Present

- Leading the neutrino electron elastic scattering ($\nu - e$) analysis in the NOvA near detector, aiming for an in situ neutrino flux measurment of the NuMI beam in order to reduce the flux uncertainty.
- One of the four primary authors for the analysis of the electron neutrino charged-current (ν_e CC) interaction cross section in the NOvA near detector. With the high-statistics, NOvA is able to perform the first-ever measurement of a double-differential ν_e CC cross section. The results were reported in PRL.

DUNE 2020 - Present

- R&D of the purity monitors for ProtoDUNE Phase-2 running. We improved the purity monitor with longer drift distance in order to reduce the systematic uncertainty.
- Leading the cold electronics tests at UC Irvine. Assembled the test stand and wrote analysis programs for the measurements of non-linearity and lifetime studies of ColdADC at LN_2 temperature.
- Deep-learning-based kinematic reconstruction and energy estimators for DUNE. We developed two CNN-based methods, 2D and 3-D, for the reconstruction of final state particle direction and energy, as well as neutrino energy, which showed considerable improvements comparing to the traditional methods.

Daya Bay 2015 - 2020

- Primary analyzer for the oscillaion analysis with the dataset acquired in 1958 days of stable operation. With reduced uncertainties of the absolute energy scale, Li9/He8 background, and the spent nuclear fuel background, the most precise θ_{13} at the time was measured. The results of θ_{13} and Δm^2_{ee} were reported in PRL.
- Important contributions to the background analysis of purified LS of JUNO using one of Daya Bay's detector.

JUNO 2014 - 2020

- Leading the GPU applications to JUNO's reconstruction. A vertex reconstruction algorithm based on GPU was developed, and it showed great speedup comparing to CPU-based reconstruction algorithms.

- Primary developer of a new energy reconstruction algorithm of JUNO. This algorithm was developed within JUNO's offical software framework (SNiPER), and the non-uniformity of the detector was able to be controlled within sub-percent level. Results were reported in JINST.
- Responsble for the design and performance test of light concentrators in JUNO. A GEANT4 program was developed to evaluate various designs, a prototype was built to validate simualtions, and performance tests in the JUNO detector was completed by simulation.
- Carried out the absolute measurements of Rayleigh scattering length of linear alkylbenzene (LAB, a solvent of liquid scintillator). A modularized and compact equipment was built and calibrated, data analysis tools were implemented. The results were reported in RSI.

Intern at IHEP July 2013, February - May 2014

- Performance test of a plastic scintillator. A test equipment was established, and a data acquisition program was developed using LabVIEW.
- High voltage dividers of several types of PMTs were soldered, and performance tests were carried out.

PROFESSIONAL SERVICE

- Served as the co-convener of the NOvA reconstruction group that's responsible for all of the software between the detector simulation and the analysis groups. [Jul. 2022 - Present]
- Served as the run coordinator who's responsible for organizing shifts, data-taking and detector safety, and coordinating the work by other working groups (DAQ, DQ, DDT and FD/ND teams). [Dec. 2020 - Jun. 2022]

TECHING EXPERIENCE

Teaching Assistant
School of Physics and Technology, Wuhan University *Wuhan, China*

- Particle physics, 2015.
- Physics experiment: detection of cosmic rays, 2014.
- Thermodynamics and Statistical Physics, 2014.

SPECIFIC TECHNICAL SKILLS

- Experience and working knowledge of programming in: C++, Python, Linux Shell Script and LabVIEW.
- Experience with ROOT for data analysis and visualization, with GEANT4 for Monte Carlo simulations, and with TMinuit toolkit for optimization problems.
- Experience with GPU programming tools: CUDA and Thrust.
- Experience with large scale data processing (HTCondor).

SELECTED PUBLICATIONS

- NOvA Collaboration et al., *Measurement of the ν_e-Nucleus Charged-Current Double-Differential Cross Section at $<E_\nu> =$ 2.4 GeV Using NOvA*, Phys. Rev. Lett. 130, 051802 (2023).
- M. Yu, **W. Wu**, Y. Ding, Q. Liu, F. Ren, Z. Zhang, X. Zhou, *A Monte Carlo method for Rayleigh scattering in liquid detectors*, Review of Scientific Instruments 93, 113102 (2022).
- M. Yu, **W. Wu**, N. Peng, T. Yu, Y. Ding, Q. Liu, F. Ren, Z. Zhang, X. Zhou, *Measurements of Rayleigh Ratios in Linear Alkylbenzene*, Review of Scientific Instruments 93, 063106 (2022).
- J. Liu, J. Ott, J. Collado, B. Jargowsky, **W. Wu**, J. Bian & P. Baldi, *Deep-Learning-Based Kinematic Reconstruction for DUNE*, [arXiv:2012.06181 [physics.ins-det]].

- **W. Wu**, G. Zhu, Q. Zhang, X. Zhou, Y. Ding, H. Qiao & J. Cao, *Thermal diffusivity and specific heat capacity of linear alkylbenzene*, Phys. Scr. 94 105701 (2019).
- **W. Wu**, M. He, X. Zhou & H. Qiao, *A new method of energy reconstruction for large spherical liquid scintillator detectors*, J. Inst. 14, P03009 (2019).
- The Daya Bay Collaboration et al, *Measurement of the Electron Antineutrino Oscillation with 1958 Days of Operation at Daya Bay*, Phys. Rev. Lett. 121, 241805 (2018).
- Q. Liu, X. Zhou, W. Huang, Y. Zhang, **W. Wu**, W. Luo, M. Yu, Y. Zheng, L. Zhou, J. Cao & Y. Wang, *Rayleigh scattering and depolarization ratio in linear alkylbenzene*, N.I.M. A 795, 284–287 (2015).

SELECTED TALKS

- *Deep-Learning-Based Kinematic Reconstruction for DUNE*, talk at APS April Meeting 2022 Apr. 11, 2022, Online
- *ProtoDUNE Detector*, talk at NuFact 2021 Sept. 5, 2021, Online
- *Cross-section Measurements in the NOvA Near Detector*, talk at the 54th Annual Users(Virtual) Meeting Aug. 5, 2021, Online.
- *ProtoDUNE Physics and Results*, talk at APS DPF Meeting 2021 Jul. 12, 2021, Online
- *Purity Monitoring for ProtoDUNE-SP*, talk at APS April Meeting 2021 Apr. 19, 2021, Online
- *Purity Monitoring for ProtoDUNE-SP*, talk at CPAD Instrumentation Frontier Workshop Mar. 18, 2021, Online
- *Neutrino energy reconstruction with a regression CNN in the DUNE far detector*, talk at NPML main workshop Jul. 22, 2020, Online
- *Neutrino oscillation studies in JUNO*, talk at NuFact 2019 Aug. 28, 2019, Daegu, South Korea
- *A brief review of recent reactor neutrino experiments*, plenary talk at the 16th FPCP conference Jul. 17, 2018, Hyderabad, India
- *Latest nGd oscillation results from Daya Bay*, talk at the 10th CPS-HEP Meeting Jun. 20, 2018, Shanghai, China