



The 190th HENPIC seminar

Current Status of Proton Charge Radius Puzzle

Speaker: Prof. Weizhi Xiong (熊伟志)

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ABSTRACT:

The proton electric charge radius (r_p) is an important quantity as it characterizes the spatial distribution of the proton's charge, and is also an essential physical input for the bound-state Quantum Electrodynamics calculations for the hydrogen atomic energy levels. In 2010, an unprecedentedly precise result was obtained using a novel muonic hydrogen spectroscopy technique. Nevertheless, this result triggered the “proton charge radius puzzle”, as it was 7σ smaller than measurements from previous ep elastic scattering and ordinary hydrogen spectroscopy experiments. Despite tremendous experimental and theoretical progress since then, many issues remain unresolved, particularly in the lepton scattering field. In this talk, I will briefly review recent progress from lepton scattering experiments, with a focus on the high-precision proton charge radius experiment at Jefferson Lab (PRad). I will also introduce the recently approved PRad-II experiment, which aims to reduce the total uncertainty of r_p by a factor of 4 compared to PRad. This new experiment will be able to push the precision frontier in electromagnetic interaction and contribute to new physics searches such as the violation of Lepton universality.

ABOUT THE SPEAKER:

Weizhi Xiong is a professor at Shandong University. He attended the University of South Carolina, received a B. S. in physics in 2012, and earned a Ph.D. from Duke University in 2020. After graduation, he joined Syracuse University and worked as a postdoc researcher between 2020 and 2022. He is a co-spokesperson for three approved experiments at JLab. His research focuses mostly on nucleon structure, particularly high-precision measurements of the proton electric charge radius, nucleon electromagnetic form factors, parity-violating deep inelastic scattering, as well as software developments for SoLID spectrometer at JLab, and future Electron-Ion Collider in China (EicC).



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