

The 192th HENPIC seminar

Nucleon-nucleon interactions at short distances

Speaker: Dr. Shujie Li (李姝洁)

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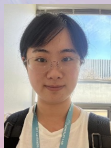
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ABSTRACT:

Among the four known fundamental forces or interactions, gravitation and electromagnetism are close to daily life, while the strong and weak forces only reveal themselves at sub-atomic or smaller scales. The strong force, which is mediated by gluon exchange between quarks confines quarks into protons and neutrons. The residual component of this strong force that induces the strong nuclear interactions between nucleons at the fermi scale (10^{-15}m). This so-called "nuclear force" is attractive at a longer distance (e.g. for nucleon separation greater than the proton radius) and binds nucleons together into nuclei, while the force is strongly repulsive at a much shorter distance which prevents the nucleus from collapsing. Nucleon interactions at short distances are not well-described in either QCD or the field theory. Experimentally, a series of electron-nucleon scattering measurements at Jefferson Lab have determined about 20% of nucleons in heavy nuclei are moving fast due to hard, short-distance interactions with another nucleons, forming so-called short-range correlated (SRC) pairs. Understanding those SRC pairs is necessary in providing a complete description of nuclear structure. It also offers us a unique chance to probe the tensor and repulsive force at intermediate to short distances. In this talk, I will present recent results from the JLab Hall A tritium program which studied the momentum distribution, and spin/isospin structure of SRC pairs in the mirror nuclei tritium and helium-3. I will then discuss how those measurements help us better understand the short-distance part of strong nucleon-nucleon interactions, and how the current and future measurements can push further by looking at the quark structure of small configurations.

ABOUT THE SPEAKER:

Dr. Shujie Li is a Postdoc at Berkeley Lab. She received her Bachelor degree from Sichuan University, and her Ph.D. from the University of New Hampshire. She is an experimental nuclear physicist exploring the nucleon-nucleon strong interaction at short distances to understand the densest and most energetic components of nuclear structure. She is also interested in testing QCD predictions and the Standard Model via electron scattering. Most of her current research are connected to the electron scattering experiments at Jefferson Lab and the future Electron-Ion Collider.



HENPIC website: <https://indico.jhep.ac.cn/event/11115>

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