中国高能核物理网络论坛
HIGH ENERGY NUCLEAR PHYSICS IN CHINA

HENPIC

The 176th HENPIC seminar

Topic discussion: UPC

October 27th, 2022, Thursday, 10:30 am (UTC+8)

Zoom meeting ID: 421 173 735, passcode: 644179

Theory (Prof. Shi Pu, USTC): Lepton pair photoproduction in peripheral, ultra-peripheral and isobar heavy-ion collisions

ABSTRACT: We have studied the lepton pair photoproduction in ultra-peripheral, peripheral and isobar collisions in the classical field approximation with the wave packet description of nuclei. We derive a general form of the cross section in terms of photon distributions which depend on the transverse momentum and coordinate based on the wave packet form of nuclear wave functions. Such a general form of the cross section in the classical field approximation contains the results of the generalized equivalent photon approximation (EPA) as well as the corrections beyond EPA in the Born approximation. By rewriting the general form of the cross section in light-cone coordinates, we find a good connection with the transverse momentum dependent distribution (TMD) factorization formalism in the Born approximation. We present the numerical results for the distributions of the transverse momentum, azimuthal angle and invariant mass for e+e− and μ+μ− pairs as functions of the impact parameter and other kinematic variables in Au+Au collisions. With the charge and mass density distributions given by the calculation of the density functional theory, we calculate the spectra of transverse momentum, invariant mass and azimuthal angle for di-electrons in peripheral collisions of Ru+Ru and Zr+Zr at 200GeV.

Experiment (Prof. Wangmei Zha, USTC):

Experimental measurements of photon induced reactions from ultra-peripheral to hadronic heavy-ion collisions

ABSTRACT: The coherent photon-nucleus and photon-photon interactions has been studied in detail to probe the gluon distribution in nucleus and to test QED via relativistic heavy-ion collisions. These kinds of interactions are traditionally thought to be only exist in ultra-peripheral collisions (UPC), where there is no hadronic interactions. However, recent experimental and theoretical progresses clearly demonstrate existence of coherent photoproduction mechanisms in hadronic heavy-ion collisions. The survival of photon induced products merits further experimental and theoretical investigations to study their properties and the link to the novel probe of QGP. In this talk, we report on the recent experimental measurements of the photon induced reactions from STAR. In corporation with the theoretical models, the physical implications of these measurements are discussed, which can shed new light on the future efforts in this field.

HENPIC website: https://indico.ihep.ac.cn/event/11115

Sponsored by Guangdong Major Project of Basic and Applied Basic Research(2020B0301030008)