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Lepton pair photo-production in peripheral, ultra-peripheral and isobaric heavy-ion collisions

We study the lepton pair photoproduction in peripheral heavy-ion collisions based on the formalism in our previous work [Phys. Rev. D 104, 056011 (2021)]. 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. Our calculation incorporates the information on the transverse momentum and polarization of photons which is essential to describe the experimental data. We observe a broadening effect in the transverse momentum for lepton pairs with and without smear effects. We also observe a significant enhancement in the distribution of $\cos(2\varphi)$ for μ+μ− pairs. Our results provide a baseline for future studies of other higher order corrections beyond Born approximation and medium effects in the lepton pair production. We also studied the photo-production in the isobaric collisions.

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