Measurements of di-hadron pairs from QED vacuum excitation in Au+Au ultra-peripheral collisions at  $\sqrt{s_{\rm NN}} = 200$  GeV from STAR Xin Wu (University of Science and Technology of China) February 14, 2024

Relativistic heavy-ion collisions generate extremely strong electromagnetic (EM) fields, providing an ideal environment to study the EM excitation of the vacuum. The Breit-Wheeler process, which involves the electron-position pair production via photon-photon interactions, represents the lowest-order decay mode of the QED vacuum excitation. Its experimental verification by the STAR experiment has stimulated further exploration into the higher-order decay modes, including the di-hadron pair productions.

In this presentation, we will report the first measurement of di-proton pairs resulting from QED vacuum excitation in Au+Au ultra-peripheral collisions at  $\sqrt{s_{\rm NN}} = 200$  GeV by the STAR experiment. The pairs' invariant mass (range from 2.1 to 2.4 GeV/c<sup>2</sup>), transverse momentum  $p_{\rm T}$ , and the azimuthal angular modulation caused by the polarized EM field will be presented. The measured results will be compared with theoretical calculations. These measurements will shed new light on the understanding of the QED vacuum.