

1     Measurements of proton-antiproton pairs from  
2             QED vacuum excitation in Au+Au  
3     ultra-peripheral collisions at  $\sqrt{s_{\text{NN}}} = 200$  GeV  
4             from STAR

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7             Relativistic heavy-ion collisions generate extremely strong electromagnetic  
8     (EM) fields, providing an ideal environment to study the EM excitation of the  
9     vacuum. The Breit-Wheeler process, which involves the electron-positron pair  
10    production via photon-photon interactions, represents the lowest-order decay  
11    mode of the QED vacuum excitation. This process was first observed by the  
12    STAR experiment in 2021, and has stimulated further exploration into higher-  
13    order decay modes, including hadron-antihadron pair production.

14            In this presentation, we will report the first measurement of proton-antiproton  
15    pairs resulting from QED vacuum excitation in Au+Au ultra-peripheral colli-  
16    sions at  $\sqrt{s_{\text{NN}}} = 200$  GeV by the STAR experiment. The pairs' invariant mass  
17    (from  $M_{p\bar{p}} = 2.1$  to  $2.4$  GeV/ $c^2$ ), transverse momentum  $p_{\text{T}}$ , and the azimuthal  
18    angular modulation caused by the polarized EM field will be presented. The  
19    measured results will be compared with theoretical calculations. These mea-  
20    surements will shed new light on the understanding of the QED vacuum.