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PHENIX experimental search for the dark photon decay to di-electron pairs

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A dark photon is a hypothetical particle which is very weakly coupled with ordinary photons in some Beyond the Standard Model (BSM) theories. The dark photon is a candidate for the annihilation of dark matter particles into e^+e^- pairs, a process which could provide an explanation for the positron excess in the universe observed by several satellite experiments. It may also explain the 3σ discrepancy between the muon $g - 2$ result and Standard Model calculations. The PHENIX experiment at RHIC has excellent capabilities for electron identification and for measuring e^+e^- pairs with a very good mass resolution, making possible a search for such pairs from dark photon decay. We have conducted a search for possible e^+e^- pairs from dark photons among a large data sample of pairs from π^0 Dalitz decays. We present new results of the dark photon search from the PHENIX experiment, which provide the world's best limits and rules out a majority of the mass-branching ratio region that could explain the $g - 2$ result.

On behalf of collaboration:

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