

Search for invisible decay of a dark photon produced in e^+e^- collisions at BABAR

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We report on a search for single-photon events in 53 fb^{-1} of e^+e^- collision data collected with the BABAR detector at the PEP-II B-factory. We look for events with a single high-energy photon and a large missing momentum and energy, consistent with production of a spin-1 particle A' through the process $e^+e^- \rightarrow \gamma A'$, $A' \rightarrow \text{invisible}$. Such particles, referred to as "dark photons", are motivated by theories applying a $U(1)$ gauge symmetry to dark matter.

We find no evidence for such processes and set 90% confidence level upper limits on the coupling strength of A' to e^+e^- for a dark photon with a mass lower than 8 GeV. In particular, our limits exclude the values of the A' coupling suggested by the dark-photon interpretation of the muon $(g-2)$ anomaly, as well as a broad range of parameters.

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