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## Searches for low-mass new-physics states with the BaBar detector

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We report on the most recent searches for unknown low-mass states performed with the data collected by the BaBar detector at the PEP-II  $e+e-$  collider.

The first search is based on a sample corresponding to  $53 \text{ fb}^{-1}$  of  $e+e-$  collision data collected with a special single-photon trigger. 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  $A' \rightarrow e+e-$  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.

Many models of New Physics postulate the existence of new gauge bosons mediating interactions between “dark sectors” and the Standard Model. We present a second search for a dark boson  $Z'$  coupling only to the second and third generation of leptons in the reaction  $e+e- \rightarrow \mu+\mu-Z'$ ,  $Z' \rightarrow \mu+\mu-$  with the full BaBar dataset. No significant signal is observed and limits improving upon bounds derived from neutrino experiments are set.

### Experimental Collaboration

BABAR

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