

New Bounds from Positronium Decays on Massless Mirror Dark Photons

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In this talk, we will present the results of a search for a hidden mirror sector in positronium decays with a sensitivity comparable with the bounds set by the prediction of the primordial 4He abundance from Big Bang Nucleosynthesis. No excess of events compatible with decays into the dark sector is observed resulting in an upper limit for the branching ratio of this process of 4.0×10^{-5} (90% C.L.). This is an order of magnitude more stringent than the current existing laboratory bounds and it constrains the mixing strength of ordinary photons to dark mirror photons at a level of $\epsilon < 5.8 \times 10^{-8}$. The future prospects to reach a sensitivity on ϵ of the order of $10^{-9} - 10^{-10}$, which is of great interest both theoretically and phenomenologically, will also be discussed.