

Anomalous e^+e^- production in ^8Be

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Predictions on the identity of the gauge boson of light dark matter suggest vector bosons in the mass range of 10 MeV - 10 GeV. Several attempts were made to find such particles by using data from running facilities. Since no evidence was found, limits were set on their mass and their coupling strength to ordinary matter. Researchers thus turn their attention to search for less massive candidates in the MeV scale and with a short life time, which decay mostly into electron-positron (e^+e^-) pairs.

In our recent work, we searched for such e^+e^- pairs in nuclear transitions. We measured their angular correlation in internal pair creation for the M1 transition depopulating the 18.15 MeV state in ^8Be . A significant, peak-like deviation was observed with respect to the predicted angular correlation for the internal pair creation.

To our best knowledge, present nuclear physics theories cannot account for such deviation, however, assuming the creation and subsequent decay of a $J^\pi=1^+$ particle with a mass $m_0c^2 = 16.70(61)$ MeV gives a satisfactory fit to our observations.

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