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Can a protophobic vector boson explain the ATOMKI anomaly?[1]
XILIN ZHANG, Ohio State Univ - Columbus, GERALD A. MILLER, University of Washington — In 2016, the ATOMKI collaboration announced [PRL 116, 042501 (2016)] observing an unexpected enhancement of the e^+-e^- pair production signal in one of the ^{8}Be nuclear transitions induced by an incident proton beam on a ^{7}Li target. Many beyond-standard-model physics explanations have subsequently been proposed. One popular theory is that the anomaly is caused by the creation of a protophobic vector boson (X) with a mass around 17 MeV [e.g., PRL 117, 071803 (2016)] in the nuclear transition. In this talk, I will discuss our recent study (arXiv: 2008.11288) which disproves this hypothesis. I will start with an isospin relation between photon and X couplings to nucleons, and then explain how these relationships suggest that the X production must be dominated by direct transitions without going through any nuclear resonance (i.e., Bremsstrahlung radiation) with a smooth energy dependence that occurs for all proton beam energies above threshold. This energy dependence contradicts the experimental observations and invalidates the protophobic vector boson explanation.

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