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Search for Hidden Sector New Particles in the 3-60 MeV Mass Range Focusing on the Hypothetical X17 Particle

The search for new particles in the low mass range is motivated by new hidden sector models and dark matter candidates introduced to account for a variety of experimental and observational puzzles: the small-scale structure puzzle in cosmological simulations, anomalies such as the 4.2σ disagreement between experiments and the standard model prediction for the muon anomalous magnetic moment, and the excess of e^+e^- pairs from the ^{8}Be and ^{4}He nuclear transitions to their ground states observed by the ATOMKI group. In these models, the 1–100 MeV mass range is particularly well-motivated, and the lower part of this range still remains unexplored. Our PRad collaboration developed an experimental proposal to search for these particles by direct detection of all three final state particles in the electroproduction experiment allowing for an effective control of the background. It will cover the 3 - 60 MeV mass range, focusing on the detection of hypothetical X17 particle. This experiment was fully approved by the recent JLab's PAC50 with a highest scientific rating (A). Currently the collaboration is preparing this experiment to be performed as early as next year. The current status of this experiment will be presented and discussed in this talk.

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