

A proposal to search for a “dark-omega” vector boson in direct electro-production processes using intense high energy electron beams

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We propose to perform new experiments to search for a new vector boson coupled via baryonic current (“dark-omega”) in the mass range of [150-600] MeV. This particle, if it exists in nature, will be produced on large-A fixed targets in the forward direction using electron beams with energies up to 11.5 GeV. High intensity and high energy electron beams are well suited for this type of search experiments. The multi-gamma decay of this, yet unknown, particle ($VB \rightarrow \pi^0 \gamma \rightarrow \gamma \gamma \gamma$) can be detected by a high resolution and large acceptance crystal calorimeter (like the existing PrimEx HyCal PbWO₄ calorimeter at Jefferson Lab). That will provide a few MeV level resolutions in the proposed multi-photon invariant mass reconstruction process. In this talk the motivation, feasibility studies of the setup and estimation of the realistic parameter space of the proposed experiment will be presented and discussed.

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