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Interpretation of the 17 MeV anomaly in ^{8}Be* decay as light, weakly coupled new physics[1] SUSAN GARDNER, University of Kentucky , JONATHAN FENG, BARTOSZ FORNAL, IFTAH GALON, JORDAN SMOLINSKY, TIM TAIT, University of California, Irvine, PHILIP TANEDO, University of California, Riverside — Recently a 6.8σ anomaly has been reported in the opening angle and invariant mass distributions of e^+e^- pairs produced in ^{8}Be nuclear transitions (Krasznahorkay et al., PRL 116 (2016) 042501). We find that the data can be explained by a 17 MeV vector gauge boson X that is produced in the decay $^8\text{Be}^* \to {}^8\text{Be}\, X$, with X decaying through $X \to e^+e^-$. The X boson mediates a new force with a characteristic range of 12 fm, and it has milli-charged couplings to up and down quarks and electrons, yielding a proton coupling that is suppressed relative to neutrons. We show that such a "protophobic" X boson is compatible with all other experimental constraints in this mass range and discuss how such an object can emerge from fundamental physics. The X boson may also alleviate the current 3.6σ discrepancy between the predicted and measured values of the muon's anomalous magnetic moment.

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