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Can nuclear physics explain the anomaly observed in the internal pair creation in Beryllium-8 nucleus?[1] XILIN ZHANG, GERALD A. MILLER, Univ of Washington — Recently, the experimentalists in [Phys.Rev.Lett.116.042501(2016)] claimed seeing unexpected enhancement of the internal electron-positron pair (e^+-e^-) production in the large e^+-e^- relative angle region in the EM transition from the Beryllium-8 nucleuss second lowest 1^+ state to its ground state. According to the experimentalists, the signal can be explained by a new neutral boson weighted around 17 MeV. This has stipulated significant interests in the particle physics community [e.g. Phys.Rev.Lett.117.071803(2016)]. In this talk, I will present our latest study of the underlying nuclear physics, and emphasize several pieces of physics that havent been well studied theoretically and not been included in the current experimental analysis, including the interferences between the dominant E1 and M1 transitions, two extra angular dependences, possible impact of E2 transition and its interferences with E1 and M1, and nuclear form factor. I will also point out that the previously measured on-shell photon production constrains the ratio between E1 and M1 contributions in the pair production, which however havent been checked in the current experimental analysis. In the end, I will discuss the possibility of nuclear physics being the origin of the observed anomaly.

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