

# Observation of Anomalous Internal Pair Creation in $^8\text{Be}$ : A Possible Indication of a Light, Neutral Boson

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## Questions about pair creation

1. Why is a virtual photon invariant mass greater than 1.022 MeV required for pair production? (**Gula**)
2. What are multipoles ( $E0$ ,  $E1$ ,  $M1$ , etc.)? Why is the angular correlation of  $e^+e^-$  pairs created in an  $E0$  transition of a different shape to that from others ( $E1$ ,  $M1$ , etc.)? (**Taya**)
3. Is direct capture solely an  $E1$  transition in this reaction? If so, why? (**Nadyah**)
4. How do IPC and EPC processes differ? (**Mamun**)

## Questions about the experiment

1. What are the advantages of making the vacuum chamber out of a carbon-fiber tube (see last para. of pg. 1)? (**Andrea**)
2. There are five spectrometers at fixed angles. How can you get so many data points at different opening angles? (**Som**)
3. How do the widths of the 18.15 MeV and 17.64 MeV states compare? Why is one of them described as isoscalar and the other as isovector? (**Shiv**)
4. How do the authors determine the quantum numbers of their hypothetical “X” particle? (**Doug**)
5. Are other experimental groups trying to check this result? If so, have they also observed a deviation? (**Tyler**)

## Dark photons etc.

1. What is a “dark photon”? What mass and coupling ranges have been excluded by previous experiments? (**Nick**)
2. Is this new boson the same particle as the one proposed in the paper Kristyn presented? (**Kristyn**)
3. What are five new particles that have been proposed in the last fifty-five years? How many of those five have actually been observed? (**Matt**)