

## New Scientific Opportunities with the TRIUMF ARIEL e-linac



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### A new light particle is being born

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A few years ago we observed anomalous electron-positron angular correlations for the 18.15~MeV M1 transition of  $8\text{Be}$  [1]. This was interpreted as the creation and decay of an intermediate bosonic particle with a mass of  $m_0c^2=16.70(35)(\text{stat})(50)(\text{sys})$  MeV, which is now called X17. The possible relation of the X17 boson to the dark matter problem triggered an enormous interest in the wider physics community. We then re-investigated the  $8\text{Be}$  anomaly with an improved, and independent setup, and confirmed the signal of the assumed X17 particle [2,3].

We also observed a similar anomaly in  $4\text{He}$  [4], which could be described also by the creation and subsequent decay of the same X17 particle. Our results agree well with the present ab initio calculations of Viviani et al., [5].

Very recently, the  $11\text{B}$  proton capture reaction was used for exciting the 17.2 MeV broad ( $\Gamma=1.15$  MeV) resonance in  $12\text{C}$  and studying their internal pair creation decay. Significant anomalies were observed in the angular correlation of the electron-positron pairs, at three different bombarding energies, which provides kinematic evidence for the X17 particle and supports their vector boson and fifth force explanation.

[1] A.J. Krasznahorkay et al., Phys. Rev. Lett. 116 (2016) 042501.

[2] A.J. Krasznahorkay et al., J. Phys.: Conf. Series 1056 (2018) 012028.

[3] A.J. Krasznahorkay et al., Acta Phys. Pol. B 50 (2019) 675.

[4] A.J. Krasznahorkay et al., Phys. Rev. C 104 (2021) 044003.

[5] M. Viviani et al., Phys. Rev. C 105, (2022) 014001.

#### Attendance

#### Contact Email

#### Scheduling Constraints

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