

# A new intensity for 93.31 keV $\gamma$ -ray from the decay of $^{67}\text{Ga}$ nuclides\*

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The advent of state-of-the-art detection systems and measurement techniques has further facilitated the evolution of precise nuclear data over the years. Derived nuclear data may be of great significance for modern-day requirements from various sectors of human life. Thus, the precise measurement of data must be ensured. As such, the radio-isotopes like  $^{67}\text{Ga}$  produced in heavy-ion induced reactions may find applications in medical purposes [1]. In the present abstract, we focused on estimating the new intensity of 93.31 keV  $\gamma$ -emission from  $^{67}\text{Ga}$  decay in  $^6\text{Li}$  reaction on Cu. The residue measurement was performed utilizing  $^6\text{Li}+^3$  ion beam bombarded on the stacks of Al backed  $\approx 1.7\text{--}2.5$  mg/cm<sup>2</sup> thick Cu-foils at BARC-TIFR pelletron facility, Mumbai, India. The measured residual cross section data may be found in Ref. [2(a)] with detailed information.

Following the measured end of bombardment activity ( $A_0$ ) from  $^{67}\text{Ga}$  decay led us to point out the discrepancy in the value of intensity for 93.31 keV  $\gamma$ -emission reported in various databases. Regardless of the consistent half-life for  $^{67}\text{Ga}$  measured from all the  $\gamma$ -rays, the measured  $A_0$  values for rest of the  $\gamma$ -rays are approximately double the value measured for 93.31 keV  $\gamma$ -ray (see Fig. 1(a)). This discrepancy may be accredited to the intensity, the sole factor playing a role as the other factors remain invariant according to the formula given in Refs. [2(b),3]. Adopting the formalism discussed in recent reports [2(b),3], we have determined a new value of intensity for the questioned  $\gamma$ -ray compared with the rest of the rays from each activated target foil used in the measurement. Fig. 1(b) reports the evaluated intensity values from all the target foils, where the deduced overall average value turns out to be  $21.60 \pm 41\%$ . The reported new value of intensity for 93.31 keV  $\gamma$ -ray holds a close agreement with values  $21.29 \pm 0.32\%$  [2(b)],  $21.41 \pm 0.41\%$  [3], and  $21.65 \pm 0.23\%$  [under review] reported in our earlier reports from different reactions. The multiple pieces of evidence concerning the discrepancy in the intensity value have been brought to attention for a planned formal measurement.

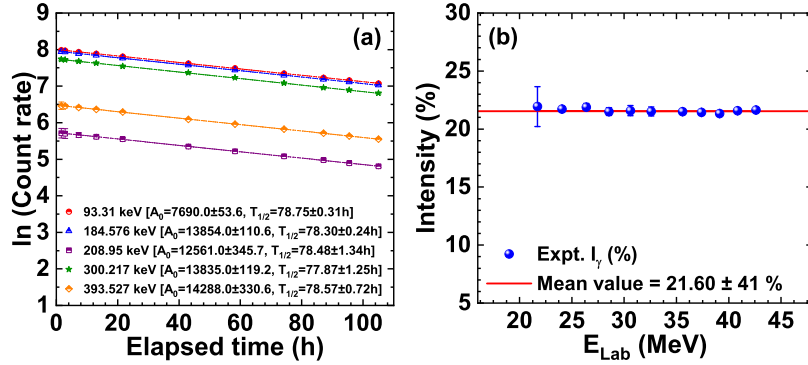


FIG. 1. (a) Experimental decay profiles and half-life of  $^{67}\text{Ga}$  using distinct  $\gamma$ -rays from one of the target foils.  $A_0$  has a unit in Bq. (b) Estimated intensity of 93.31 keV  $\gamma$ -ray from each target. The red line denotes the overall mean value.

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\* Grant No. CRG/2018/002354 from SERB(IN), MHRD fellowship from the Government of India

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