

## 6 - 1 New Trapezoid-shaped Frisch-grid Ionization Chamber for Low-energy Particle Measurements

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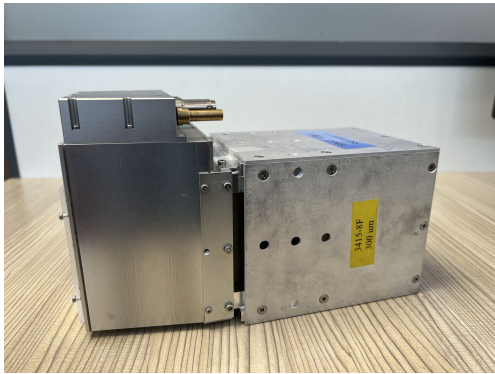


Fig. 1 (color online) Photo of the telescope (TFG-IC and DSSSD).

Many laboratories in the world have built telescope arrays based on silicon strip position-sensitive detectors such as MUST2<sup>[1]</sup>. However, these methods lack detection and identification capability of a large number of low-energy particles produced over a wide range of beam energies. To improve the present experimental capabilities, we have developed a trapezoid-shaped Frisch-grid ionization chamber (TFG-IC) as part of a telescope system to cover the identification of low-energy incident particles, which is a special shielding-window structure designed to improve the drifting electric field, and the TFG-IC-based charged-particle telescope system was constructed, including TFG-IC and double-sided silicon strip detector(DSSSD), as shown in Fig. 1.

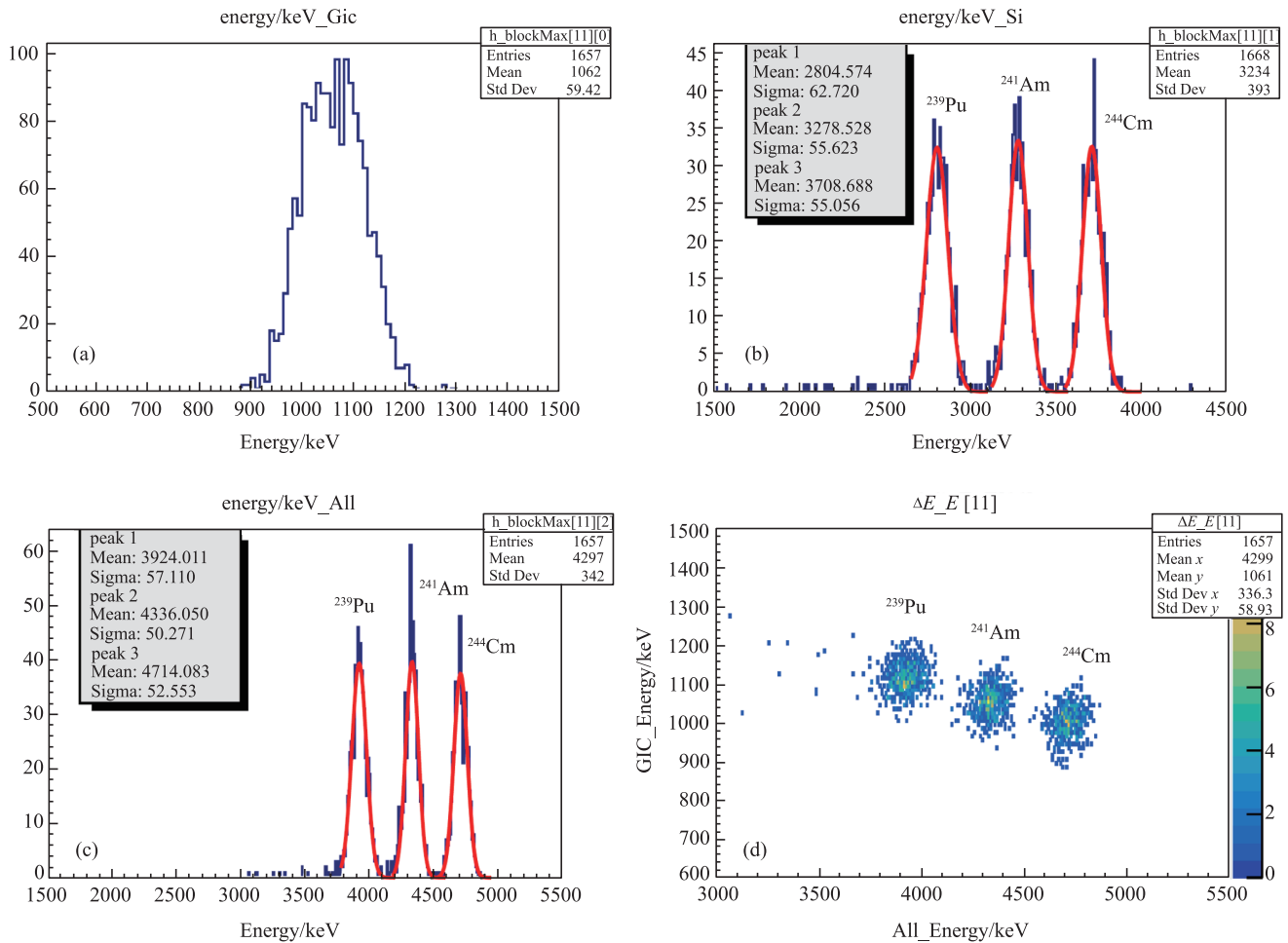


Fig. 2 (color online) Results of the measurement with a three-component alpha source for the telescope system.

The feasibility of the scheme was confirmed through measurements with an  $\alpha$  source for TFG-IC, as shown in Fig.2. Overall, the telescope system can resolve alpha particles well with different energies. In order to simulate the operation of the ionization chamber in a beam experiment, we set up a model according to the experimental setup. Using the simulation data, a two-dimensional  $\Delta E$ - $E$  scatter plot of TFG-IC+DSSSD was constructed for each telescope and determined for all isotopes, p, d and t particles can be separated in the low-energy region using the CF<sub>4</sub> gas at 150 mbar pressure as the working gas, as shown in Fig.3. In summary, we present in this article the Advanced Mass Estimate (AME), a new approach based upon the telescope technique using TFG-IC. This method will extend the isotopic identification to heavier nuclear-reaction products.

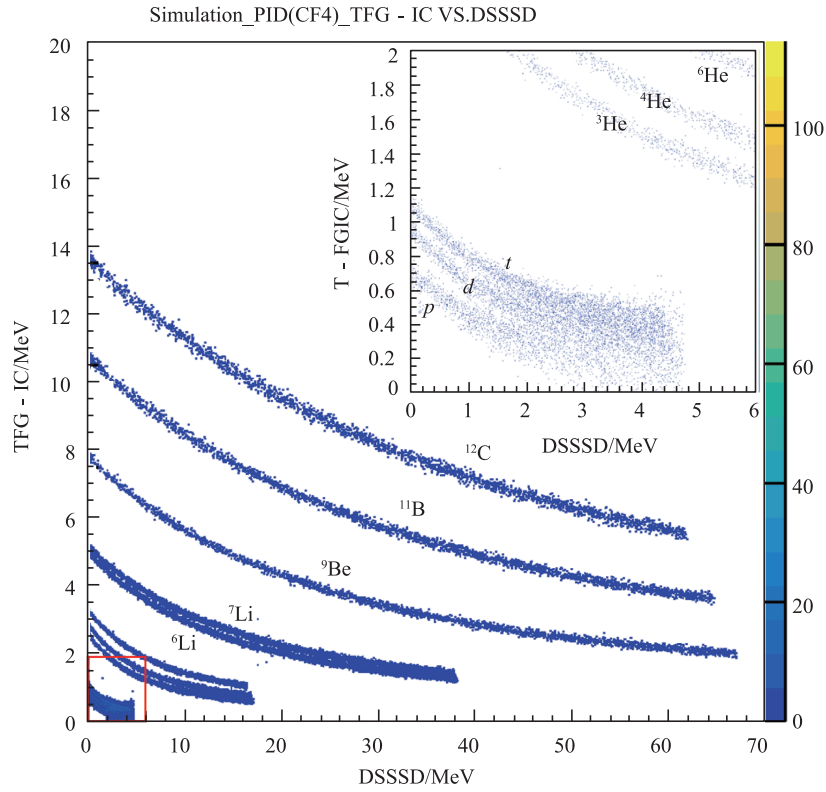


Fig. 3 (color online)  $\Delta E$ - $E$  correlation in the telescope for simulated data.

### Reference

[1] E. Pollacco, European Physical Journal A, 25.(2005)1.