

The counter has an internal volume of  $0.65 \text{ cm}^3$  and the active volume is  $0.49 \text{ cm}$  in diameter and  $3.0 \text{ cm}$  long. It is made of materials known to be free of radioactive contaminants. The cathode is made of zone refined iron, and the outer envelope is made of silica glass. The center wire is made of tungsten and is  $25 \text{ microns}$  in diameter. Since the materials used are metals and silica glass, the counter can be outgassed by heating, and, as a consequence it does not exhibit memory effects after counting relatively high level  $\text{Ar}^{37}$  samples. A window is provided at the end of the counter so that X-rays from an  $\text{Fe}^{55}$  source can be used for energy calibration, see Figure 3. The sample of argon gas along with 5 to 10 percent methane is introduced into the counter through two silica glass tubes with stopcocks that join to a common taper joint. The argon is compressed into the counter by a Toepler pump, and the mercury columns are brought to the ends of the capillary tubes that lead to the active volume of the counter.

The counter is operated inside the well of a  $12.7$  by  $12.7 \text{ cm}$  sodium iodide scintillation counter. Exterior to this is a mercury shield  $3 \text{ cm}$  thick, a ring of proportional counters, and a  $30 \text{ cm}$  thick iron shield. Events in anticoincidence with the scintillation counter and the ring of proportional counters are measured on a  $100$  channel pulse height analyzer, and recorded on a continuously advancing paper tape. The pulse shape is displayed on a storage oscilloscope and recorded photographically. In this way possible noise pulses can be noted and eliminated. Less than a few percent of the observed pulses are caused by electrical noise, and these are usually below channel  $20$ . The voltage on the counter is set so that the  $2.8 \text{ keV}$  peak from the  $\text{Ar}^{37}$  decay is centered at channel  $50$  in the spectrum. The resolution of the counter for  $\text{Ar}^{37}$  is  $28$  percent (full width at half maximum), and, for events within this resolution, the counter has an efficiency of  $51$  percent.