

## Scintillation Detector For Neutron Counting

### Li-based neutron scintillator

- Effective pulse-height discrimination between  $\gamma$  and neutrons ( $\gamma/n$  down to  $10^{-5}$ )
- Nominal sensitivity up to  $S_0 = 1.4 \text{ CPS} / (\text{n.cm}^{-2}.\text{s}^{-1})$
- Fast response – more than  $10^6$  neutrons / second
- Low sensitivity to  $\gamma$  overfeed

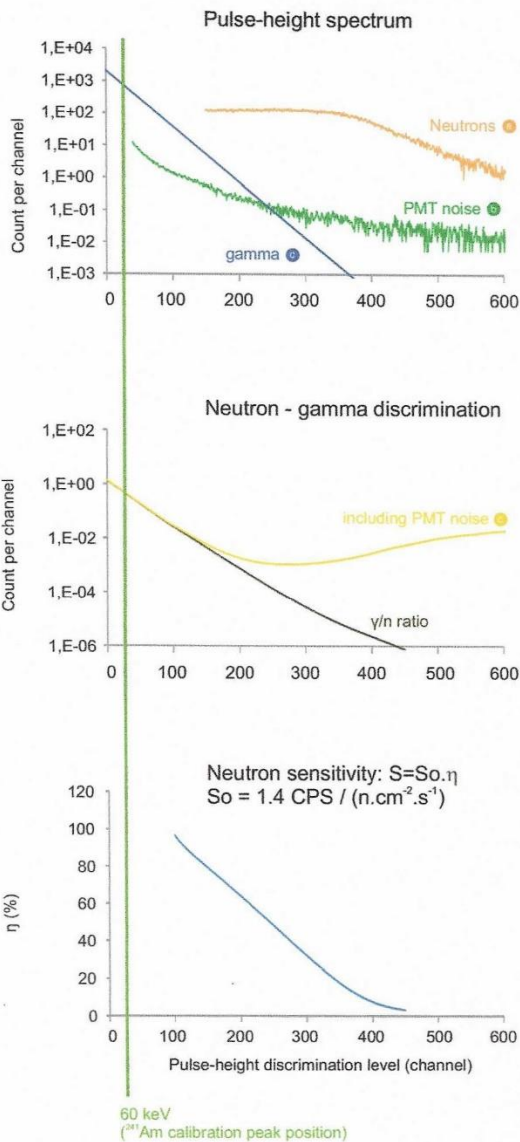
### Scintillator detector

- High signal over 10 mV
- Ambient HV needed, typically about 1000 V
- PMT noise easily rejected by PSD (Pulse-Shape-Discrimination) or by coincidence of 2 PMTs
- Easy threshold calibration with  $^{241}\text{Am}$  @ 60 keV
- No microphonic effect

### Simple to use

- Connect scintillation detector to measurement apparatus
- Make a calibration measurement of  $^{241}\text{Am}$ @60keV
- Setup threshold with respect to the calibration - to set neutron / gamma discrimination and efficiency  $\eta$  (see graphs)
- Measure neutrons





## Pulse - height and discriminaton characteristics

- Thermal neutron flux equal to the  $\gamma$  flux (e.g. here in the graphs, both  $50 \text{ cm}^{-2} \cdot \text{s}^{-1}$ )
- Conservative estimate, independent on the  $\gamma$  spectrum (i.e. the worst case)
- PMT noise behaves as „fake”  $\gamma$ . Usual rate - 0.1 CPS. Can be neglected at high neutron flux or can be filtered out via PSD (puls-shape discrimination)

## PMT noise reduction

- Available through PSD (Puls - Shale Discrimination)

