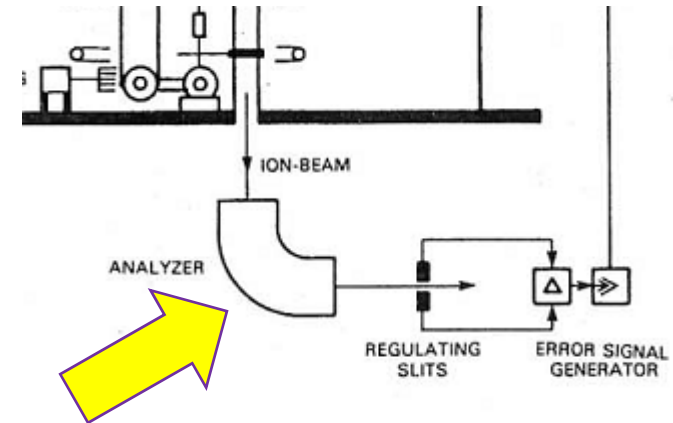


Beam Properties

$$r = \frac{(2mE)^{1/2}}{qB} \left(1 + \frac{E}{2mc^2} \right)^{1/2}$$

HW 9

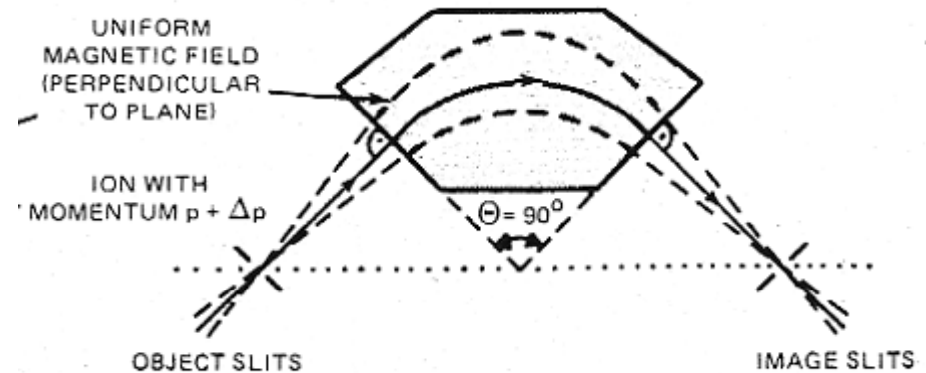
$$r = \frac{1}{qBc} (2mc^2E + E^2)^{1/2}$$



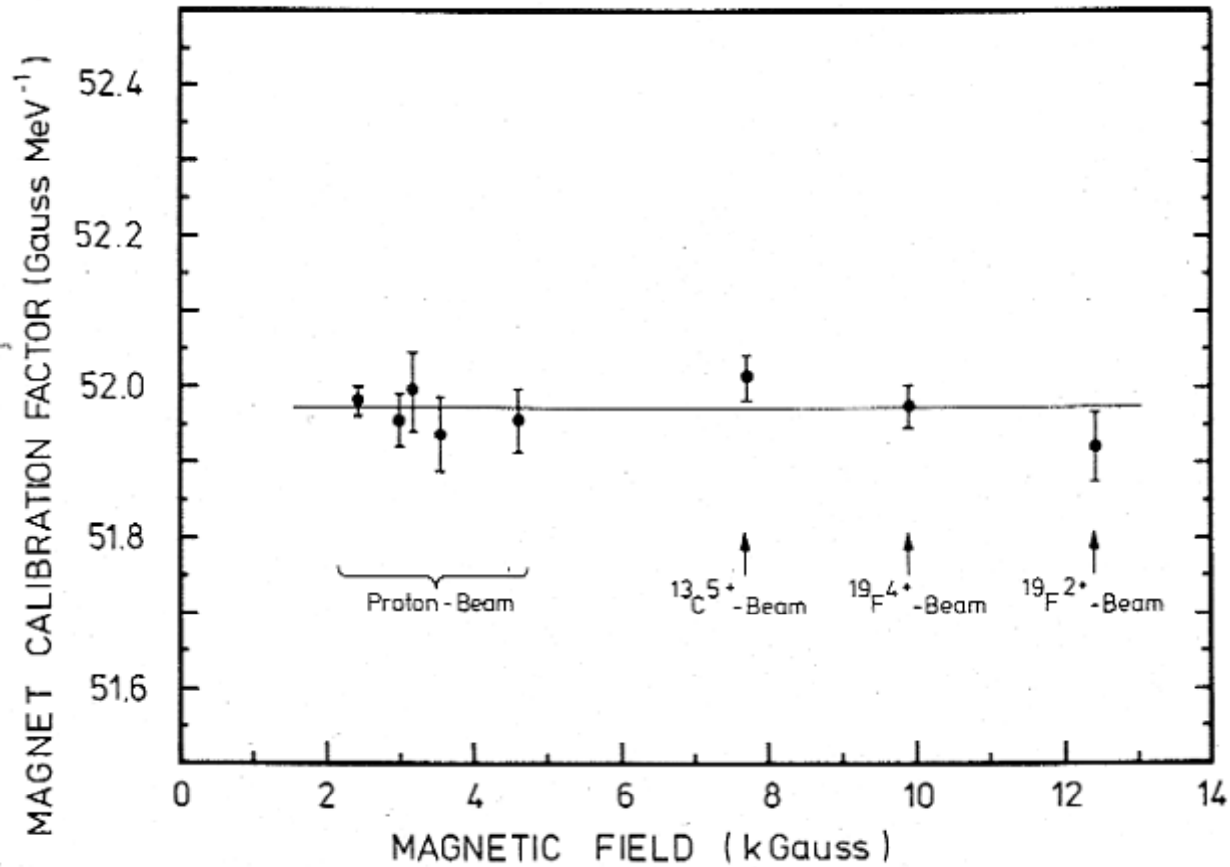
- B is measured using Hall or **NMR** probes.
- Fringe effects.
- Magnetic constant

$$K = qB / (2mc^2E + E^2)^{1/2}$$

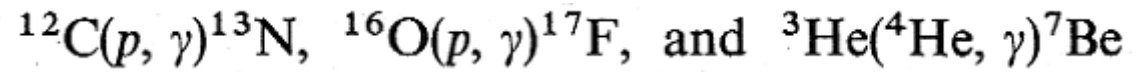
$$f = A \sqrt{ME \left(1 + \frac{E}{2Mc^2} \right)}$$



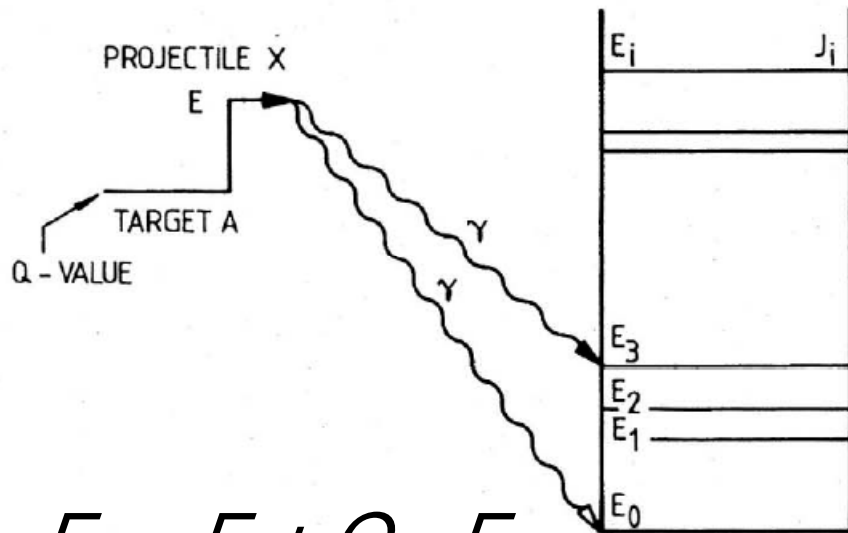
Beam Properties



Beam Properties



$Q \approx 600 \text{ keV}$



$$E_{\gamma} = E + Q - E_{ex}$$

Non-resonant
Capture
(all energies)

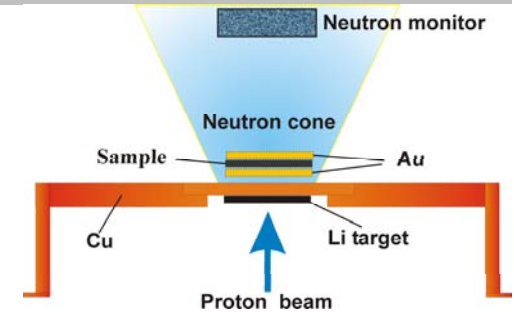
- Low Q -value \rightarrow low E_{γ}
- HPGe detector calibrated using standard sources.

Beam Properties

TABLE 5.2 Absolute Energies of Some Proton-Induced Nuclear Reactions^a

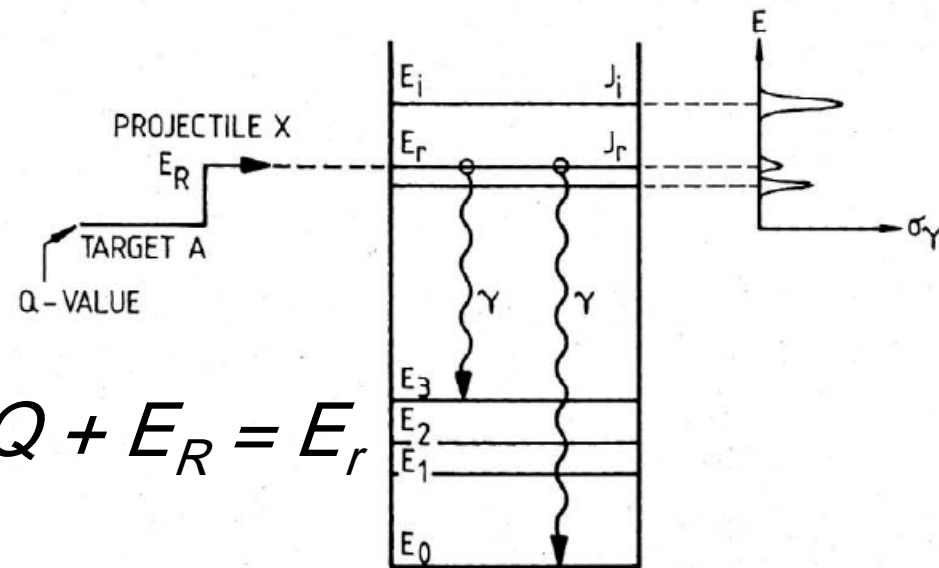
Reaction	Proton Resonance (keV)	Proton Threshold (keV)
$^{11}\text{B}(p, \gamma)^{12}\text{C}$	163.1 ± 0.2	...
$^{14}\text{N}(p, \gamma)^{15}\text{O}$	278.1 ± 0.4	...
$^{19}\text{F}(p, \alpha\gamma)^{16}\text{O}$	340.46 ± 0.04	...
$^{19}\text{F}(p, \alpha\gamma)^{16}\text{O}$	872.1 ± 0.2	...
$^{27}\text{Al}(p, \gamma)^{28}\text{Si}$	991.90 ± 0.04	...
$^7\text{Li}(p, n)^7\text{Be}$...	1880.60 ± 0.07
$^{13}\text{C}(p, n)^{13}\text{N}$...	3235.7 ± 0.7
$^{19}\text{F}(p, n)^{19}\text{Ne}$...	4234.3 ± 0.8

$$T_{Th} = -Q \frac{m_Y + m_b}{m_Y + m_b - m_a}$$



Look for recent accelerator calibration energies.

HW 10



$$Q + E_R = E_r$$

Resonant Capture

(selected energies with large X-section)

Beam Properties

Resonance $^{19}\text{F}(p,\alpha\gamma)$

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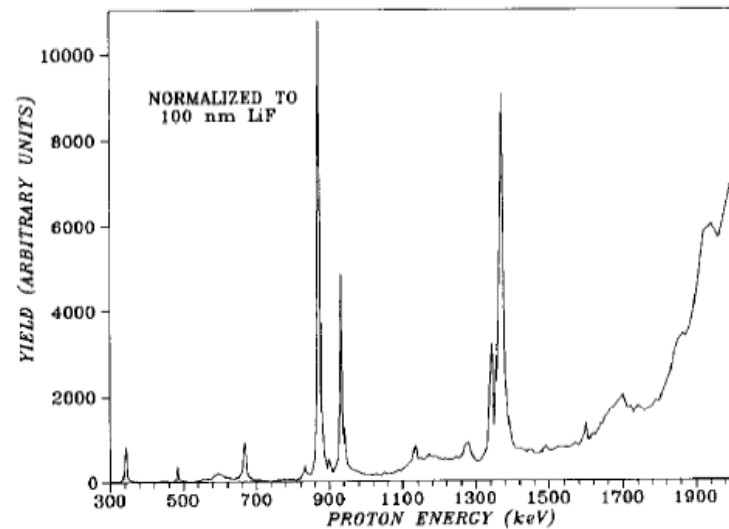
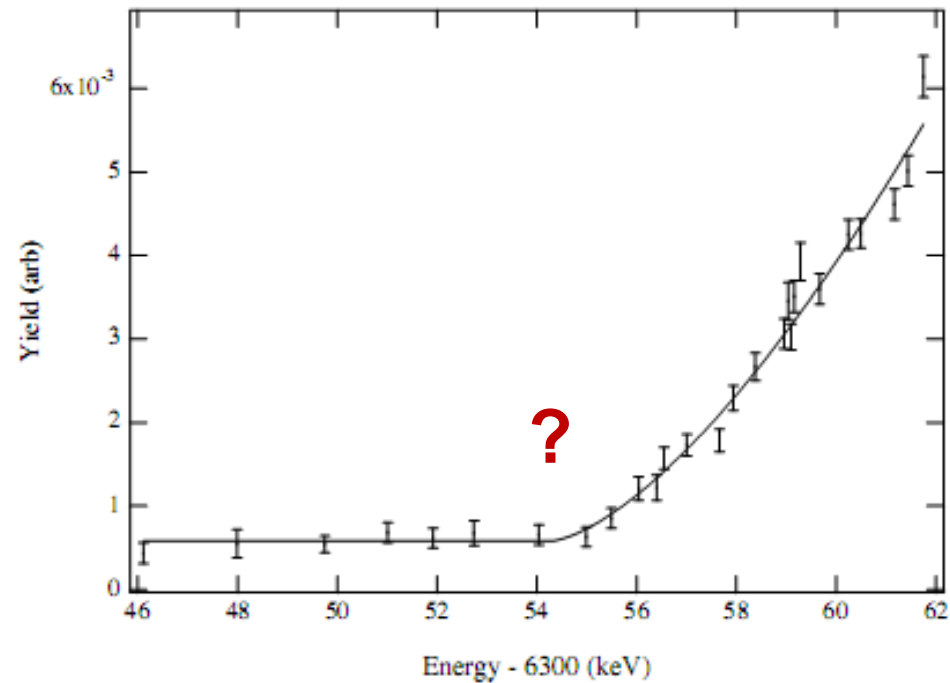


Fig. 1. Overview of the excitation curve from $E_p = 0.3\text{--}2.0$ MeV, where isolated and narrow resonances are found.

Threshold $^{14}\text{N}(p,n)^{14}\text{O}$

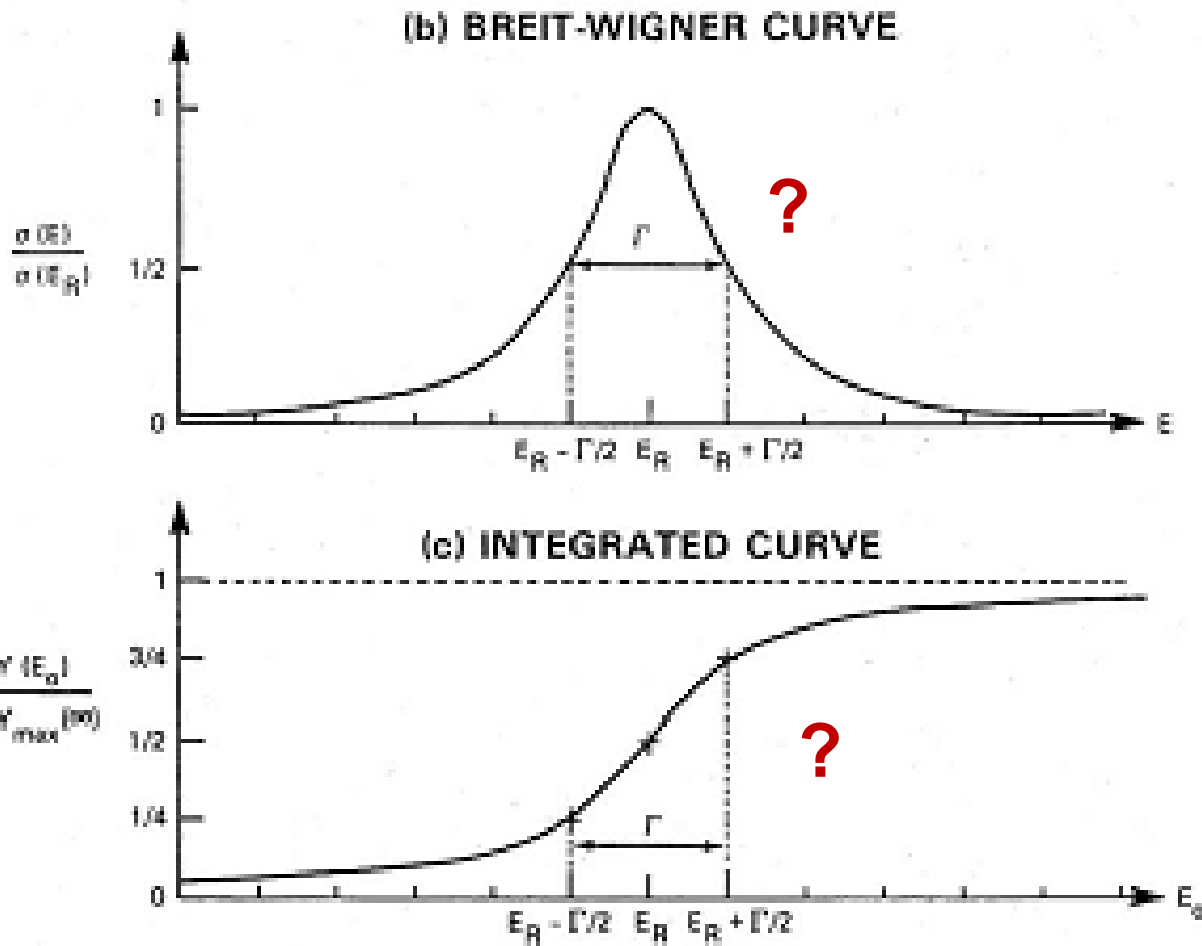


Beam Properties

Resonance

SRIM

Thin and thick target yields?



Beam Properties

Compare SRIM

