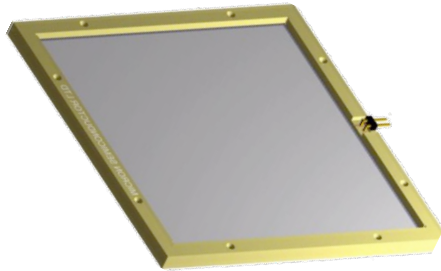
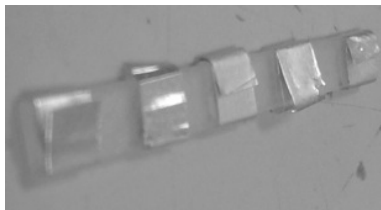


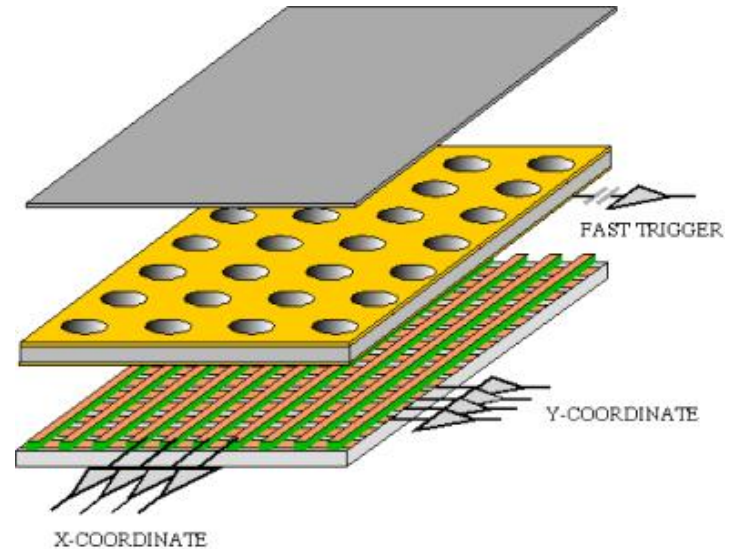
Notes
solid state vs gas detectors



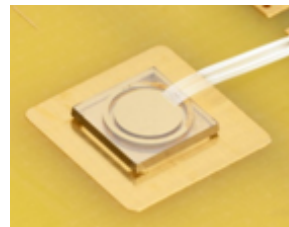
Silicon detector



Scintillator detector



GEM detector



Diamond detector

materials for thermal neutron conversion: which one?

${}^6\text{Li}$

$\sigma(0.025)$
 $\approx 940 \text{ b}$
 available E
 4.78 MeV

${}^{157}\text{Gd}$

$\sigma(0.025)$
 $\approx 240 \text{ kb}$

${}^{10}\text{B}$

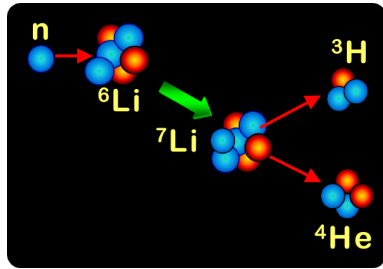
$\sigma(0.025)$
 $\approx 3840 \text{ b}$
 available E
 2.79 MeV
 (and gamma rays)

${}^{113}\text{Cd}$

$\sigma(0.025)$
 $\approx 20 \text{ kb}$

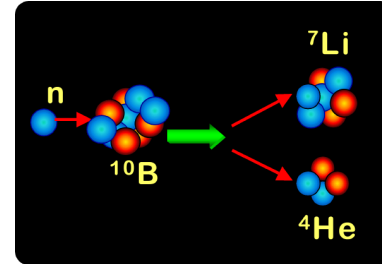
large available E
 but in form of gamma rays:
 difficult neutron identification

materials for thermal neutron conversion: which one?

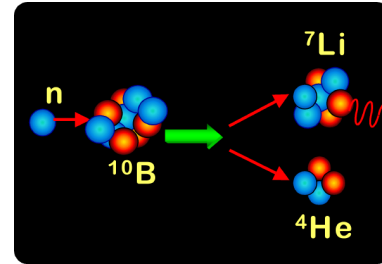


${}^6\text{Li}$

$\sigma(0.025)$
 ≈ 940 b
 available E
 4.78 MeV



${}^{10}\text{B}$



$\sigma(0.025)$
 ≈ 3840 b
 available E
 2.79 MeV
 (and gamma rays)

detection of ${}^3\text{H}$ and/or ${}^4\text{He}$

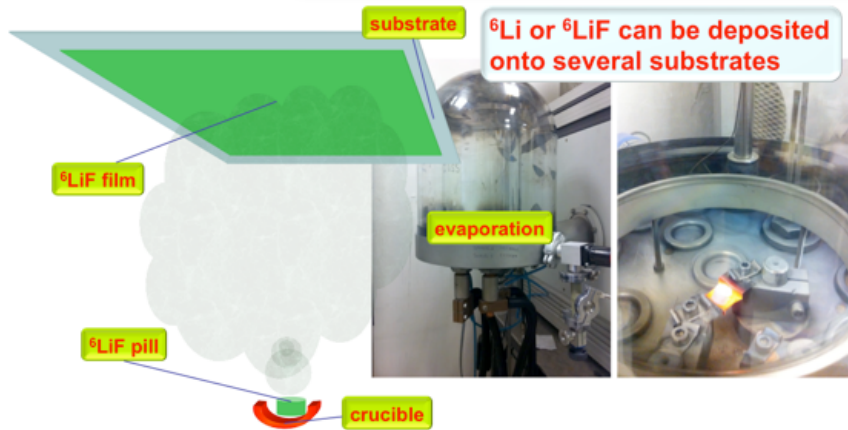
detection of ${}^4\text{He}$ (and ${}^7\text{Li}$?)

lower kinetic energy

≈ 1 gamma ray /capture

natural abundance: 7% vs 20%

converter deposition technique



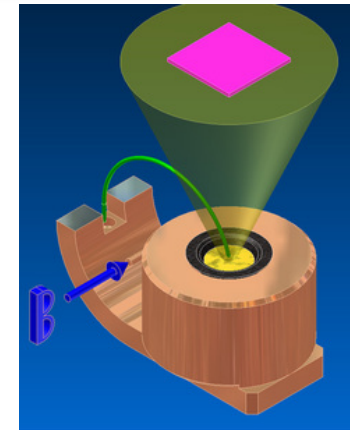
solid state

rough, simple, fast, cheap

substrate: glass, Al, C,...

substrate thickness $\approx 1\mu\text{m}$?

adherence: not quite relevant



gas

delicate, complex, slow, cost?

substrate: ceramic, ...?

substrate thickness ?

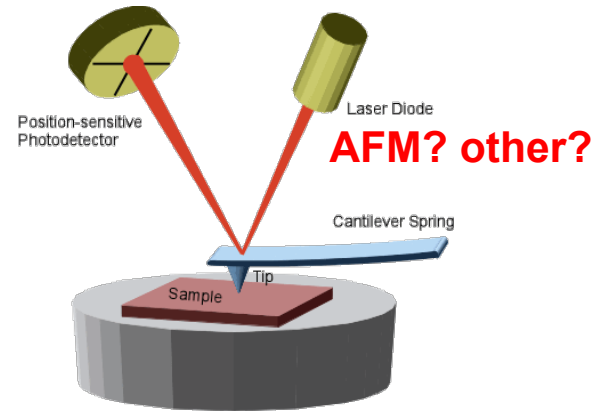
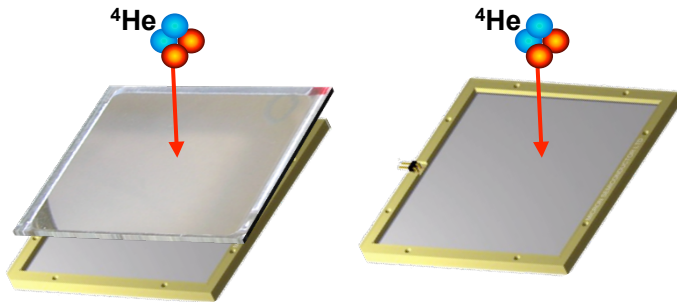
adherence: mandatory

converter thickness measurement

solid state

gas

alpha source



exploits the same detector

additional equipment needed?

rough, simple, fast, cheap

delicate, complex, slow, cost?

output in mg/cm^2 of converter

output depends on chemistry?

overall mechanical structure

solid state

gas



robust, manageable

delicate, bulky?

little non-detector material

non-detector material?

operating features

solid state

vacuum compatible

low voltage

very stable

closed

easily assembled/disassembled

**no physical/chemical agents
on the converter**

gas

under vacuum?

high voltage?

stability?

sealed?

needs gas flow?

**the converter sees gas, ions,
electrical discharges**

conclusions?
open discussion

NICKELODEON
**JIMMY
NEUTRON**
BOY GENIUS

