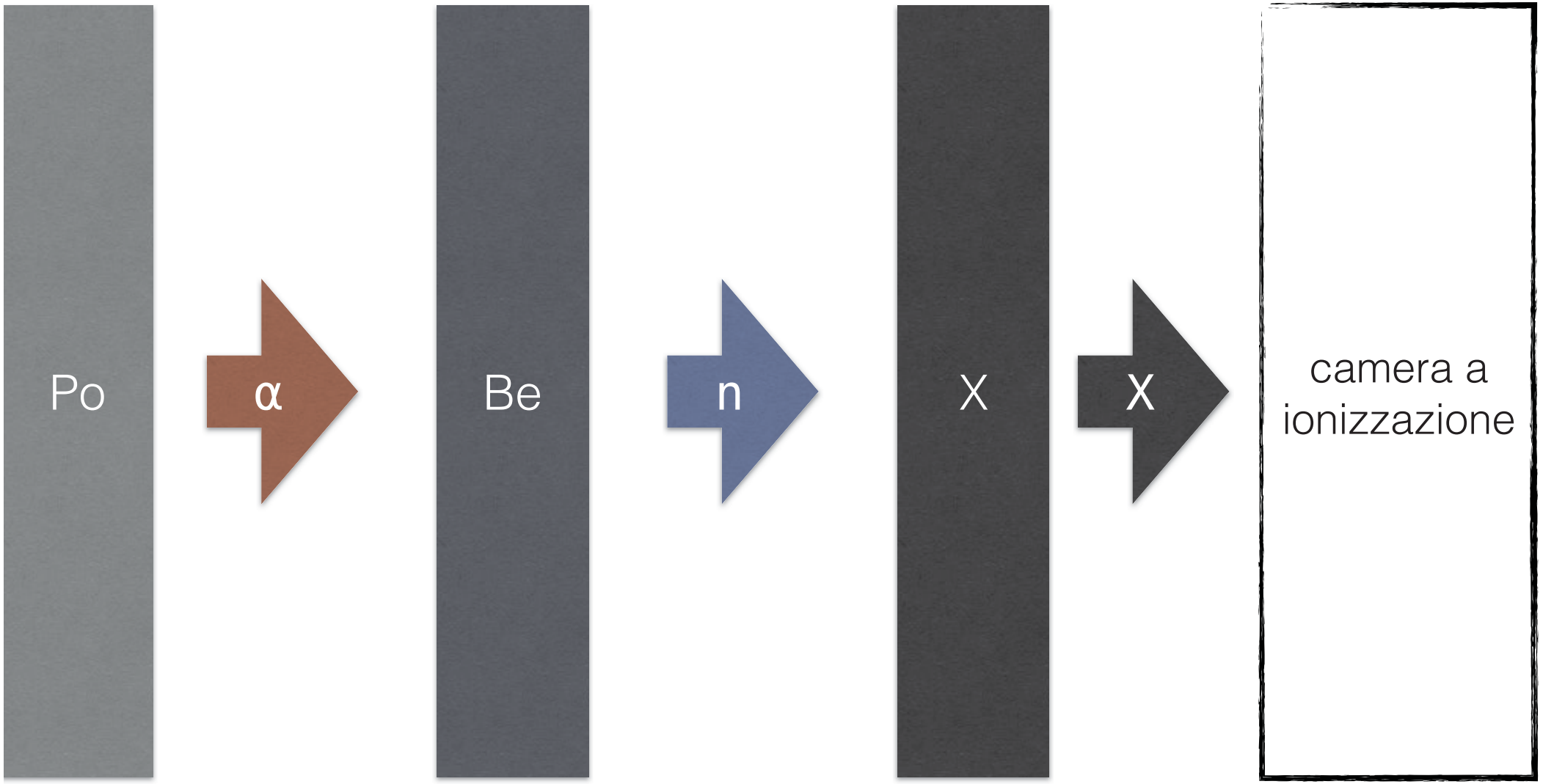
Lavorare coi neutroni

sviluppo di fasci con tecniche Monte Carlo

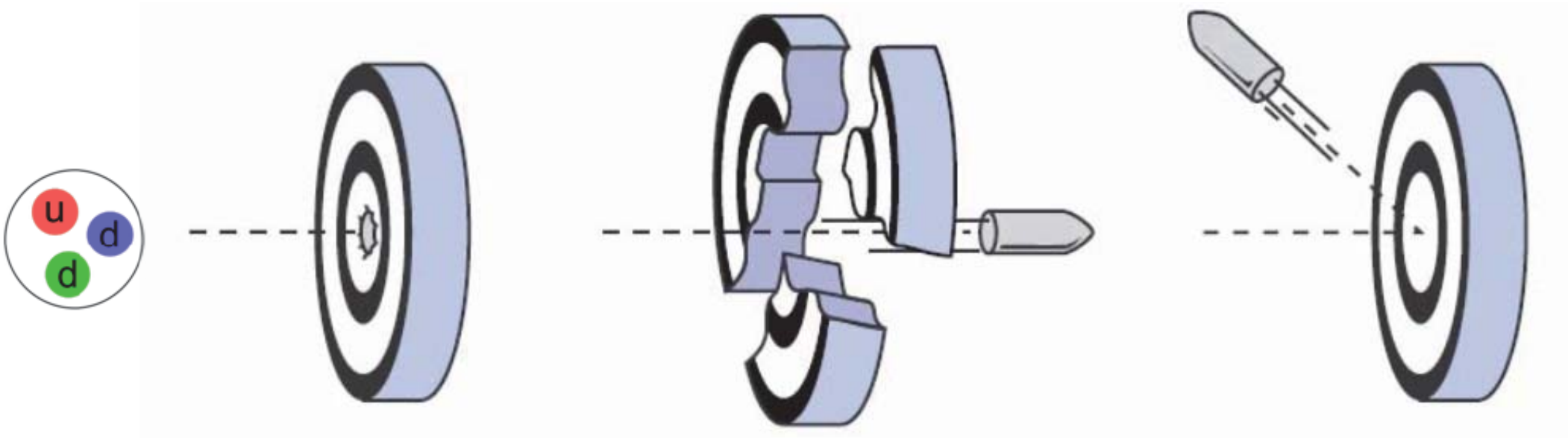
Chadwick, James. "Possible existence of a neutron." *Nature* 129.3252 (1932): 312.

$^{9}Be(\alpha,\mathbf{n})^{12}C$



I neutroni interagiscono principalmente attraverso la forza forte coi nuclei.

I processi di interazione più frequenti sono



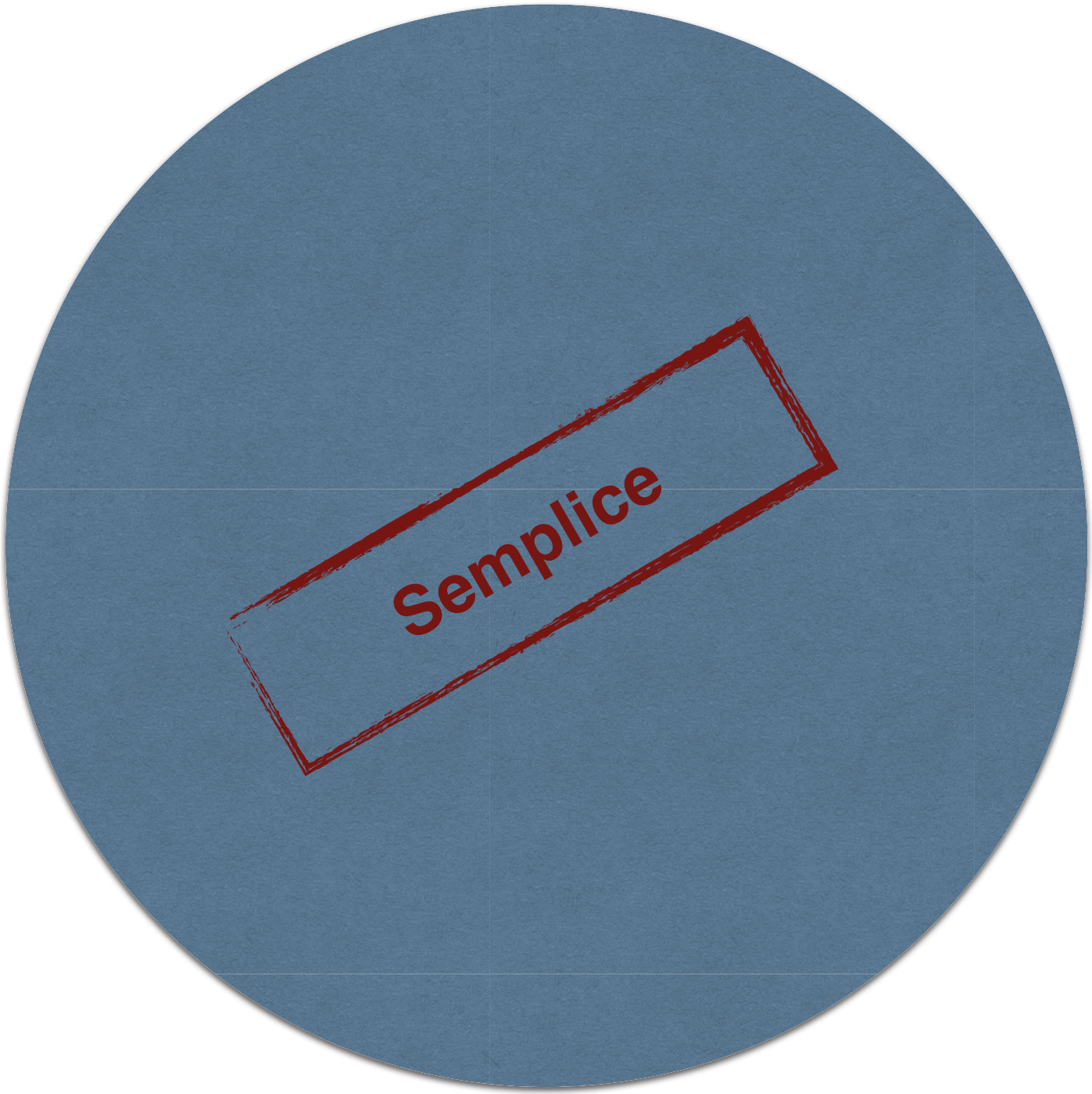
Assorbimento Fissione Scattering

Possiamo quindi descrivere il **trasporto dei neutroni** nella materia attraverso …

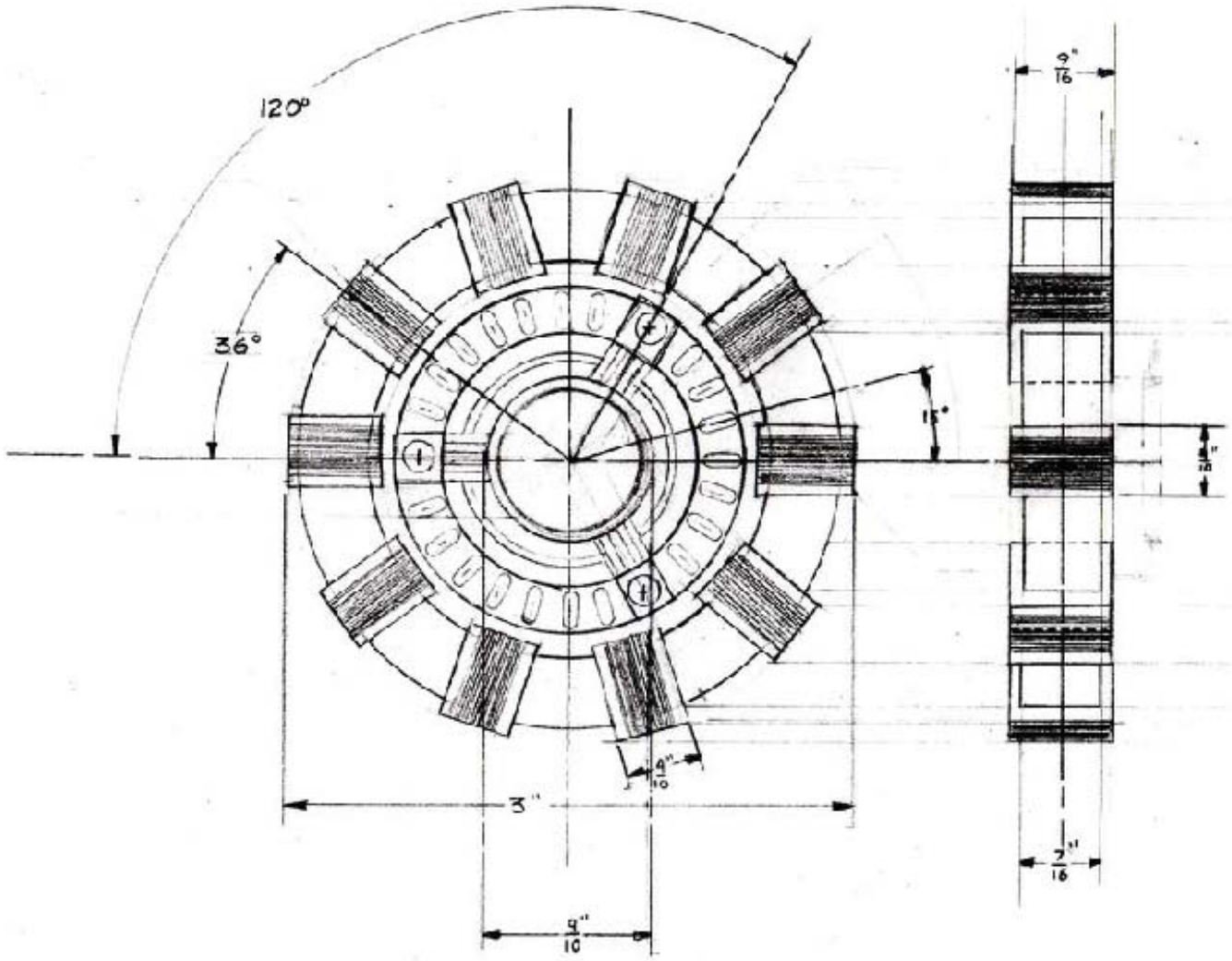
Equazione di continuità

$$\frac{\partial n(\vec{\mathrm{r}},t)}{\partial t} = s(\vec{\mathrm{r}},t) - \Sigma_a(\vec{\mathrm{r}})\phi(\vec{\mathrm{r}},t) - \nabla \cdot \vec{\mathrm{J}}(\vec{\mathrm{r}},t)$$

La variazione del numero di neutroni in **r** ad un certo istante *t* è pari al numero di neutron emessi da una sorgente meno il numero di neutroni assorbiti meno il numero di neutroni che fuoriesce.


Semplice

STARK INDUSTRIES

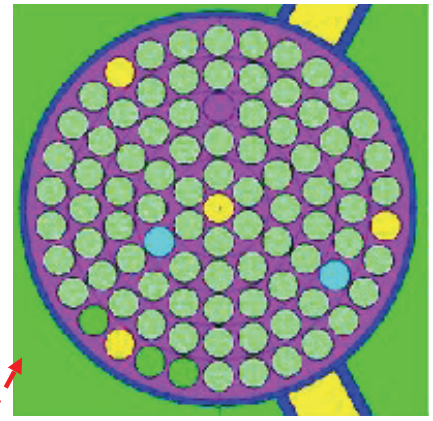


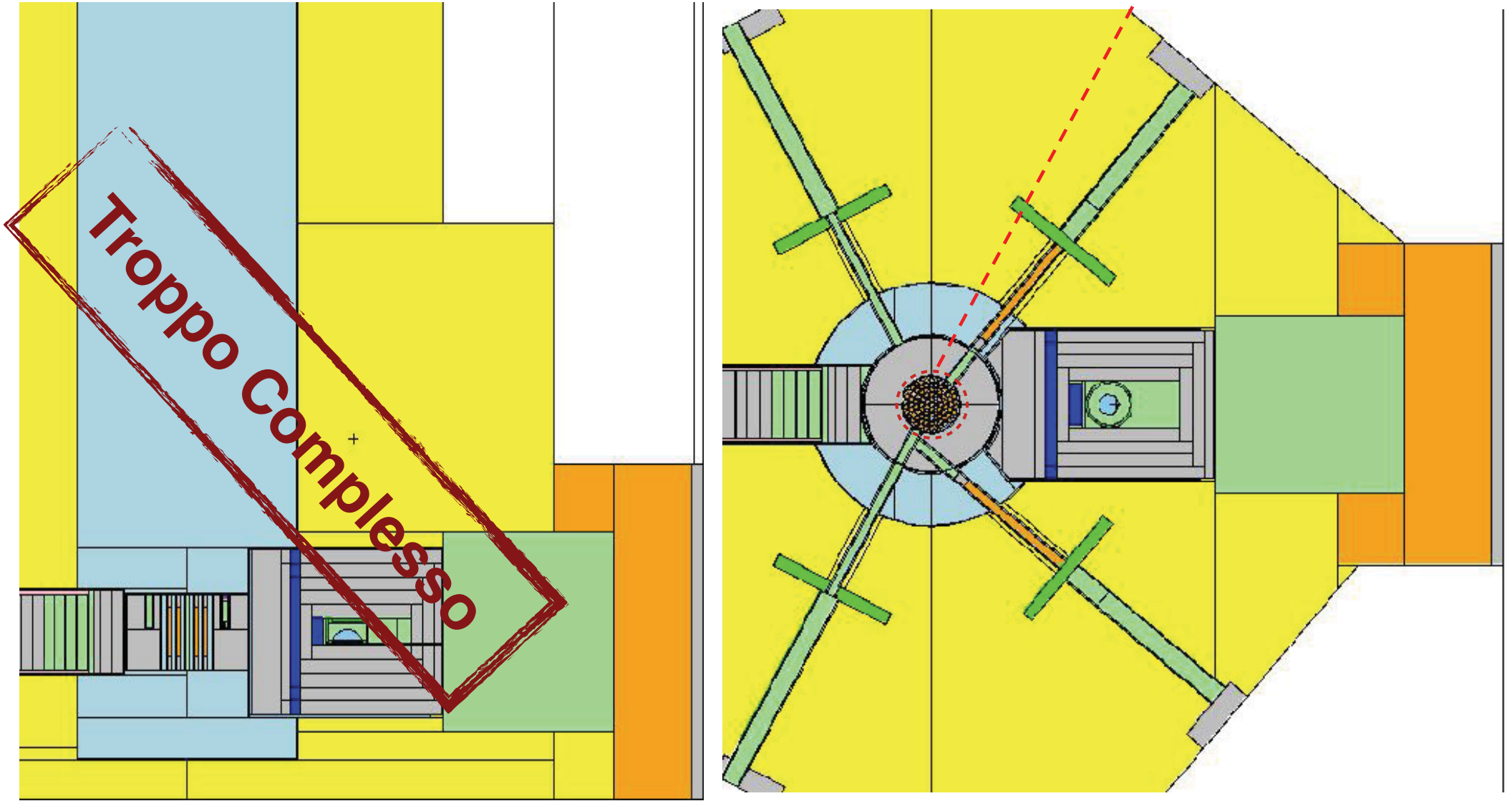
FULL SCALE

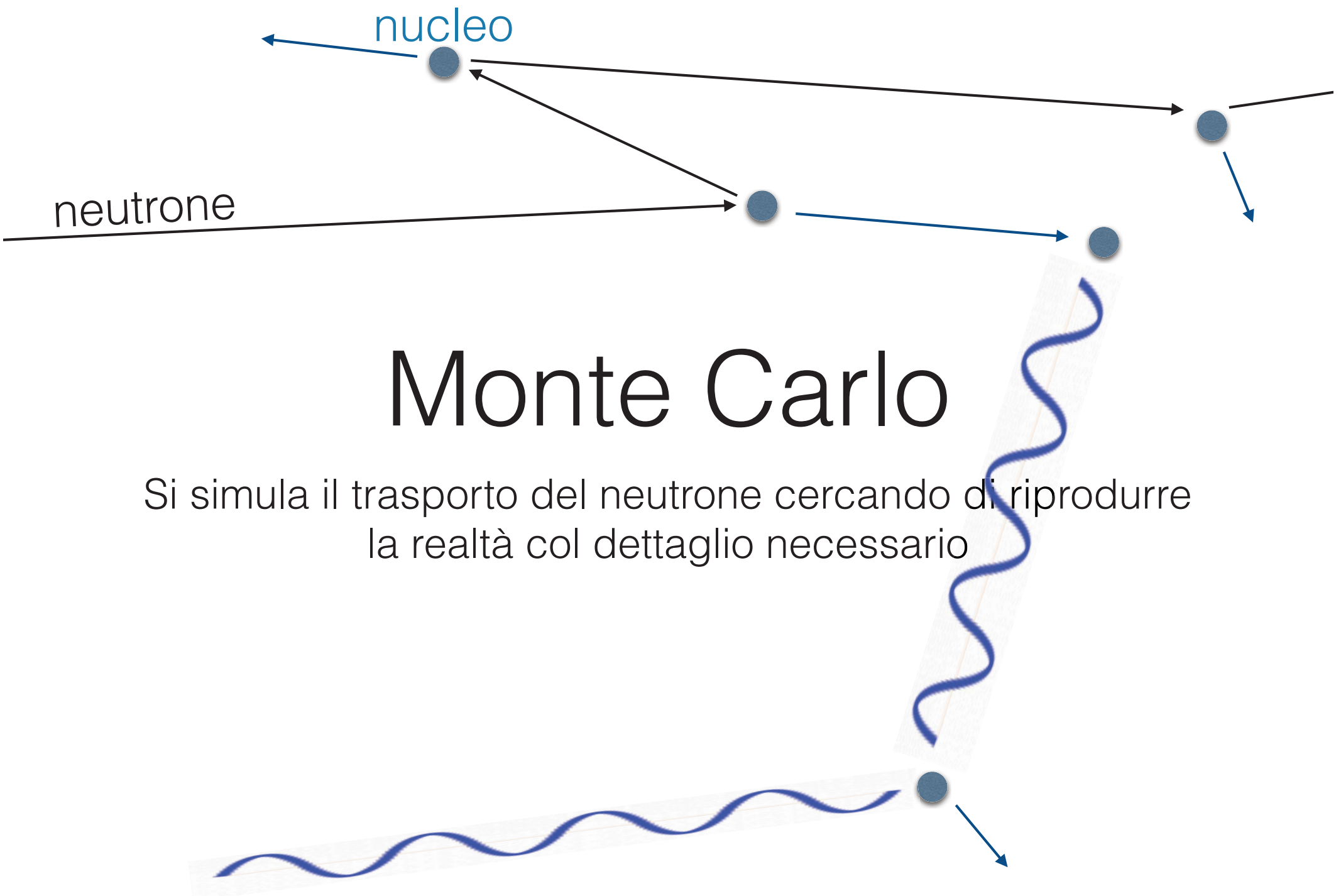
DATE		DRAWN BY	FILE NUMBER	DRAW NO
MAY 21, 2010	ARK REACTOR *For Personal Use Only*	FINNEBURGH, MARCUS	1240289	A-1a

TRIGA MARK II

250 KW nuclear reactor
PAVIA University LENA



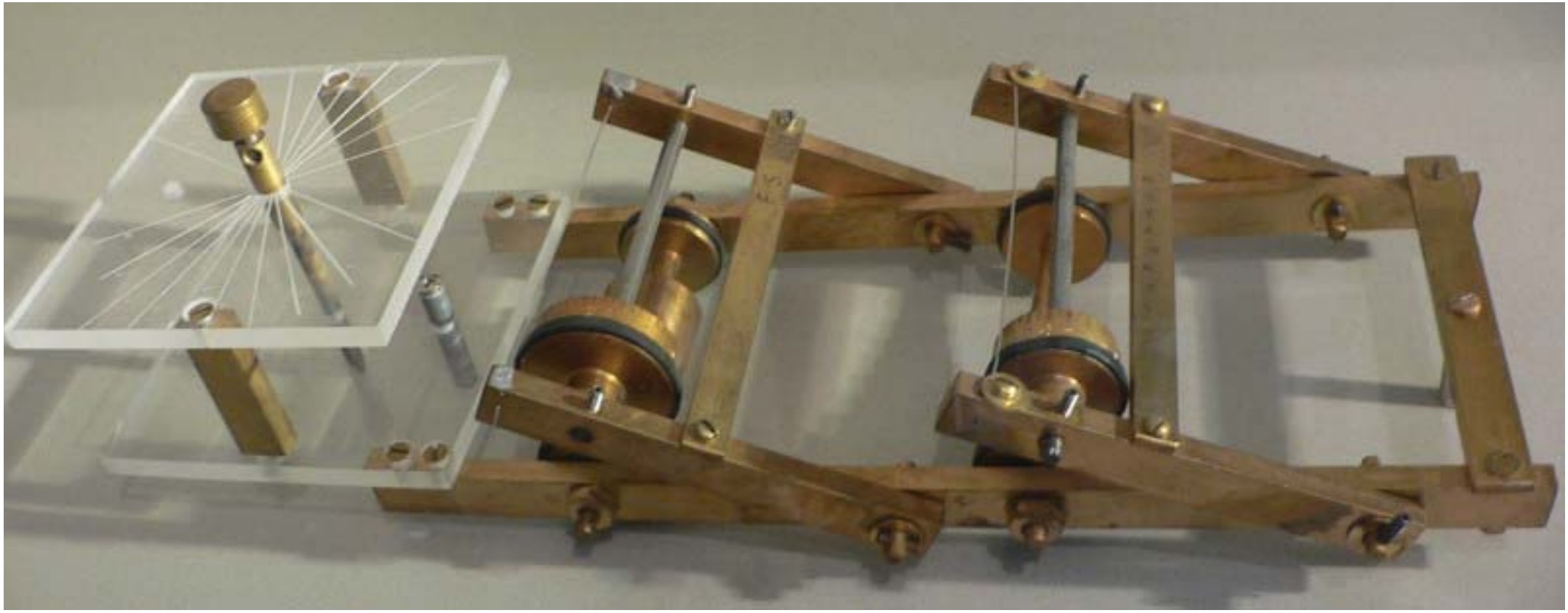




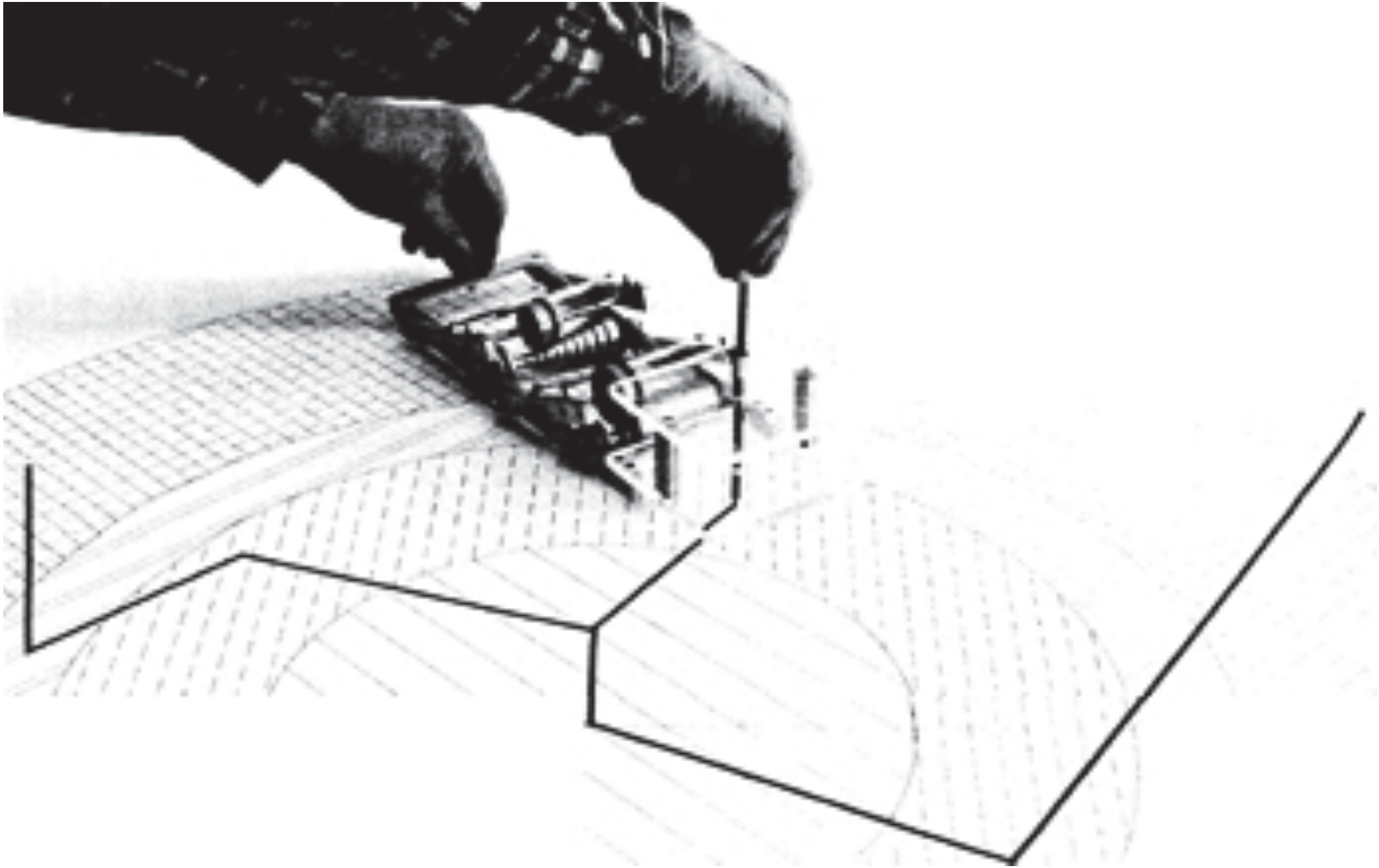
Monte Carlo

Si simula il trasporto del neutrone cercando di riprodurre la realtà col dettaglio necessario

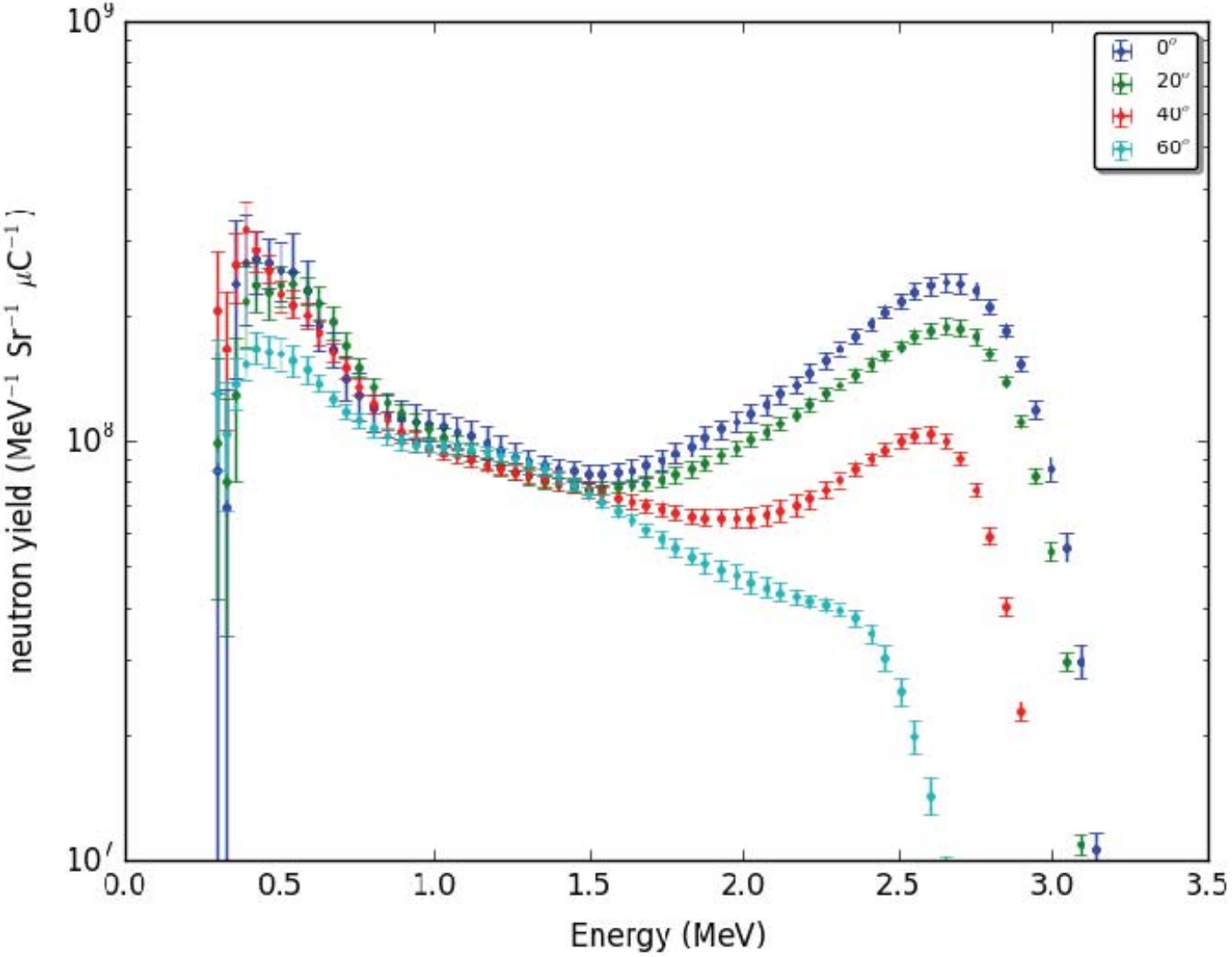
FERMIAC



Fermi and L.D.P. King

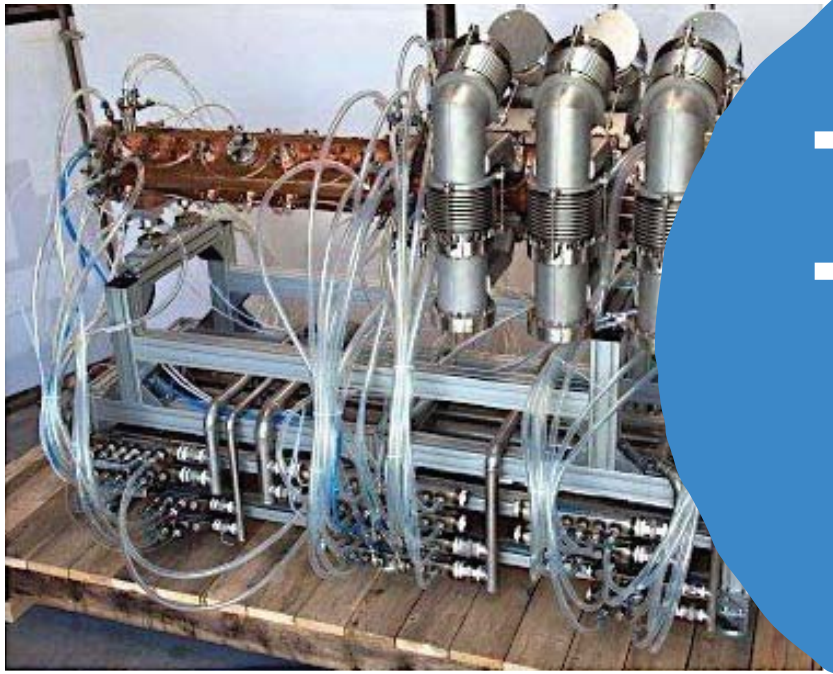



ENIAC
THE WORLD'S FIRST ELECTRONIC, LARGE SCALE,
GENERAL- PURPOSE DIGITAL COMPUTER
Penn
Engineering
2005/12/13 12:49 pm

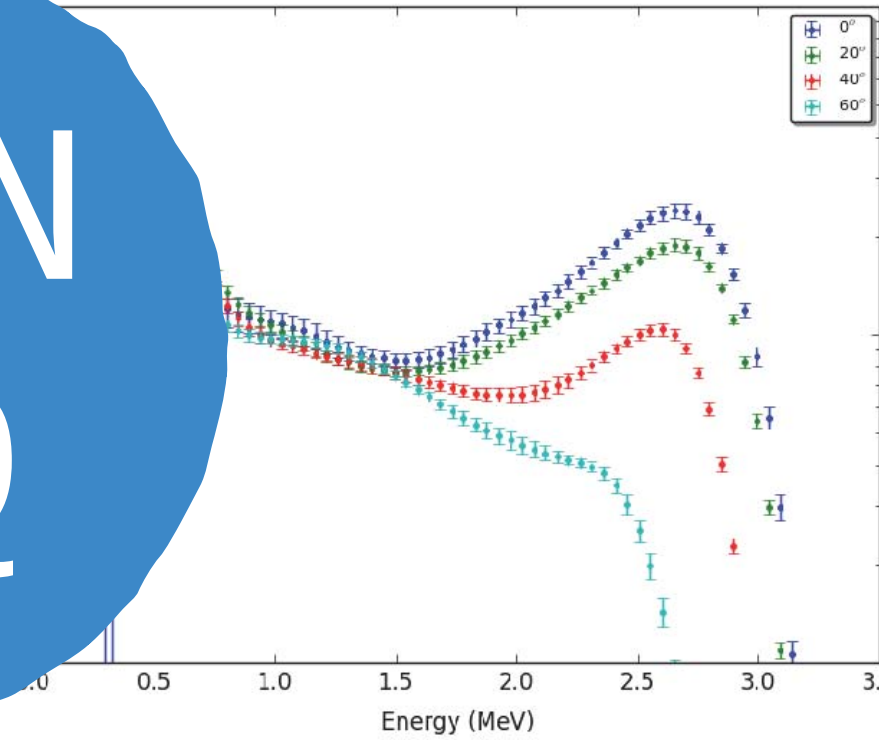


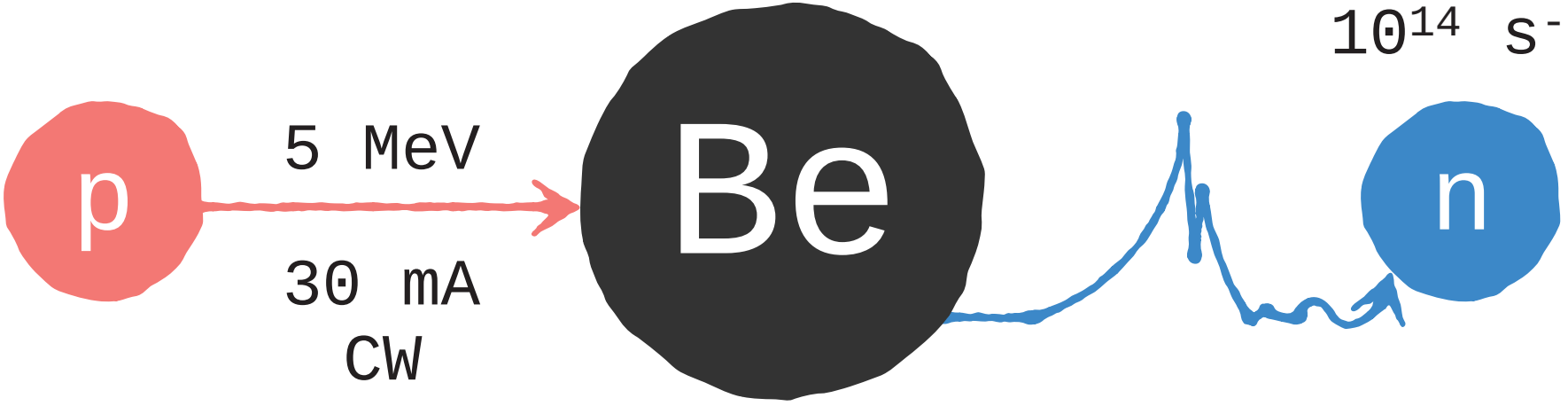
Sorgente di neutroni veloci

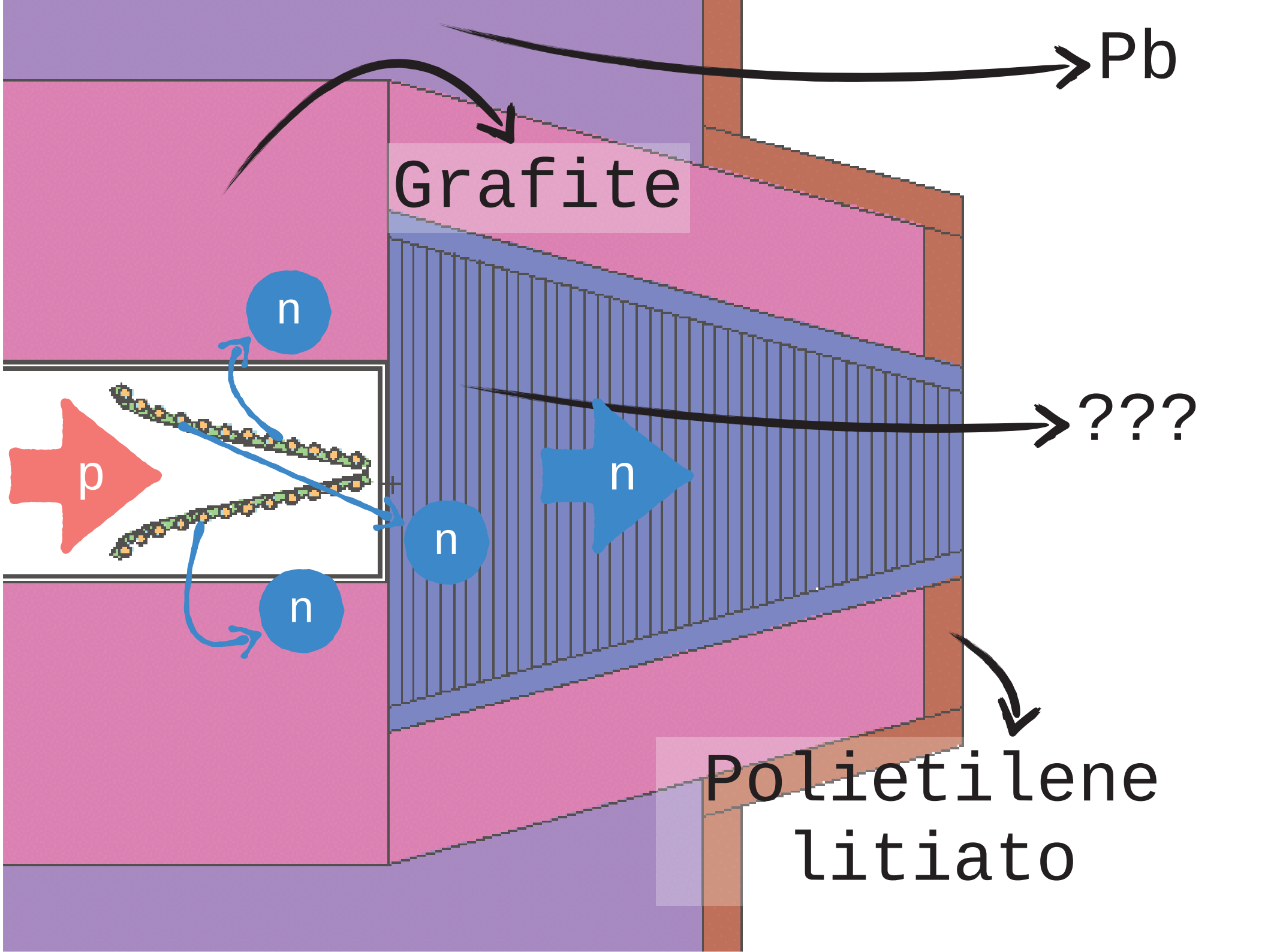
definiamola in funzione di E, Ω e **r**



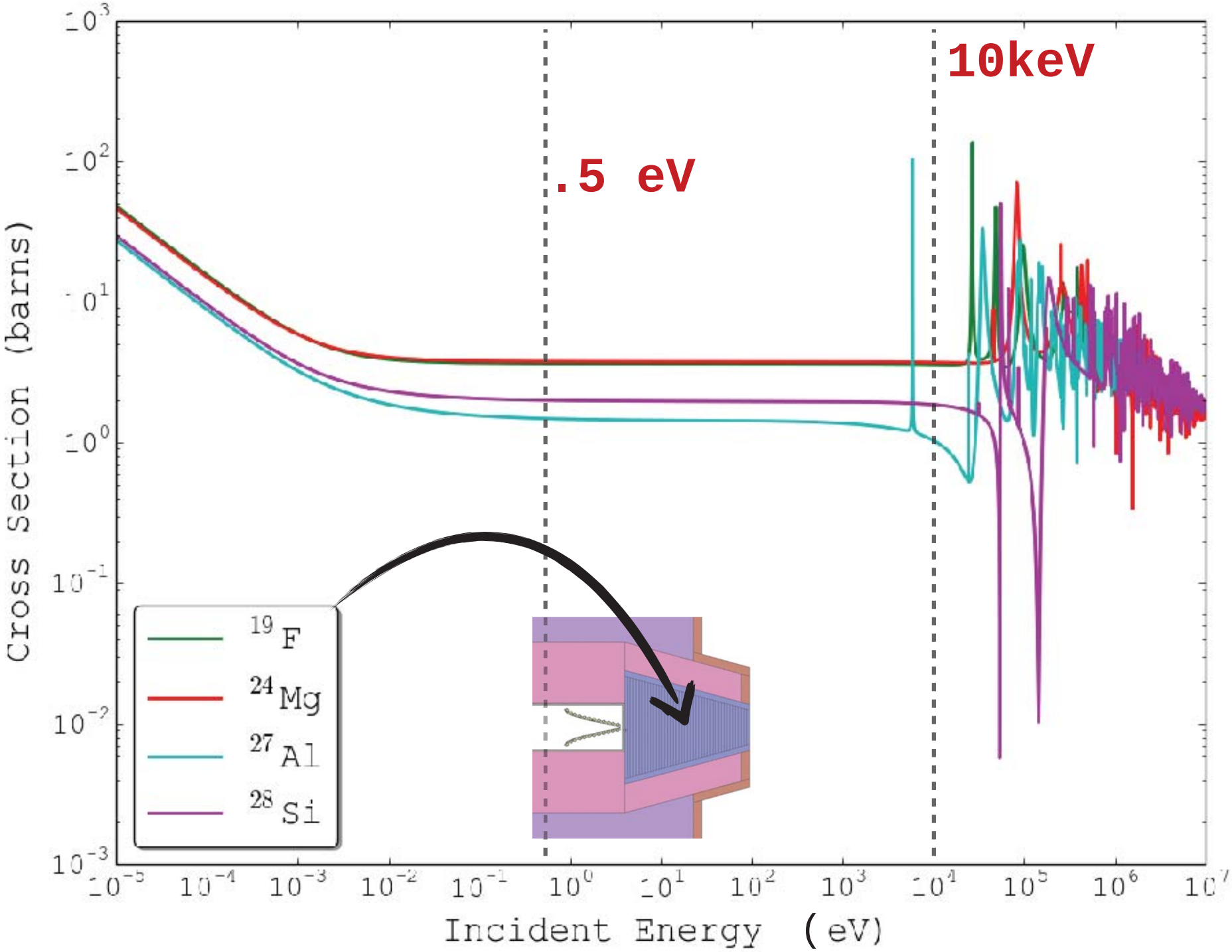
INFN RFQ

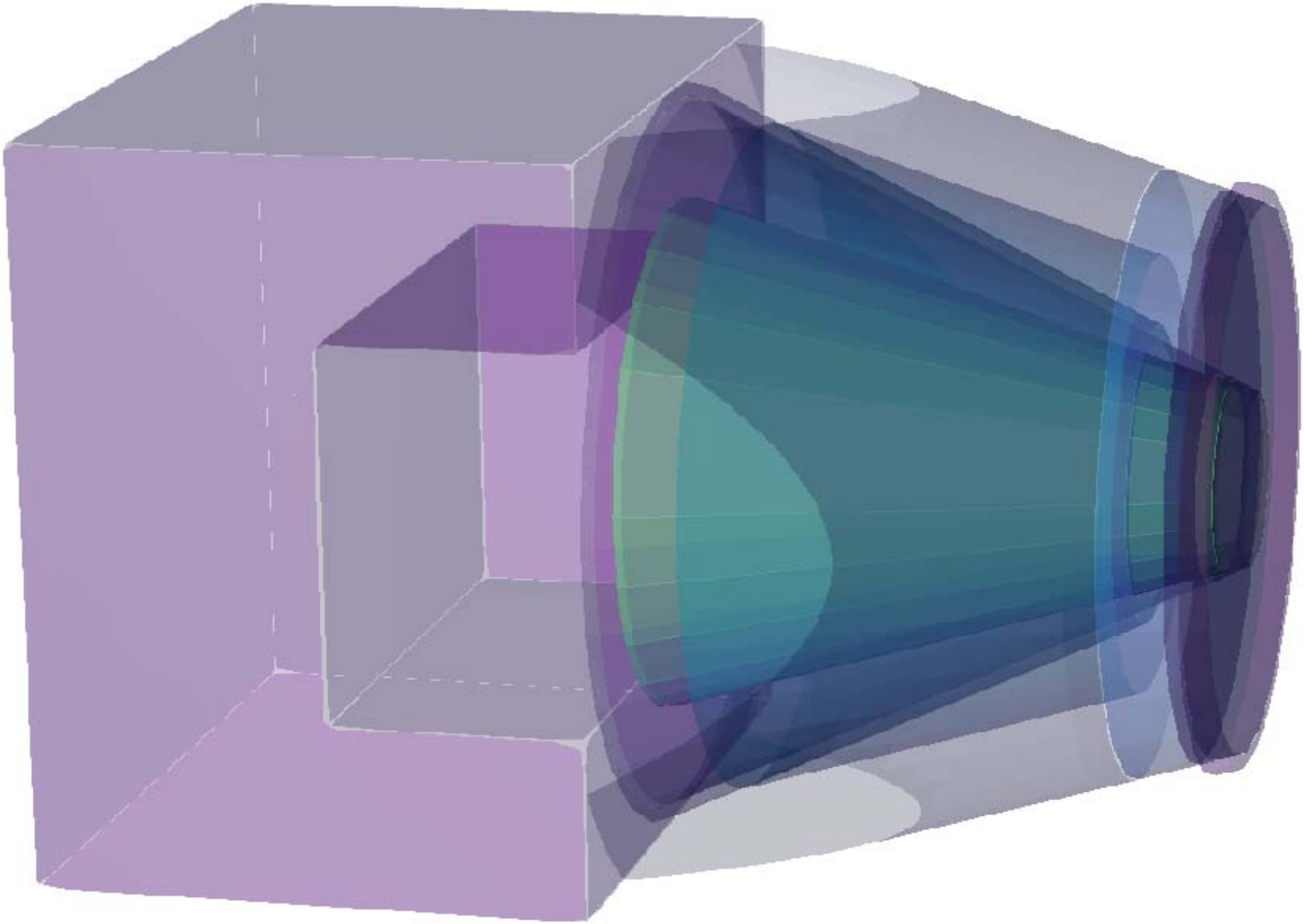


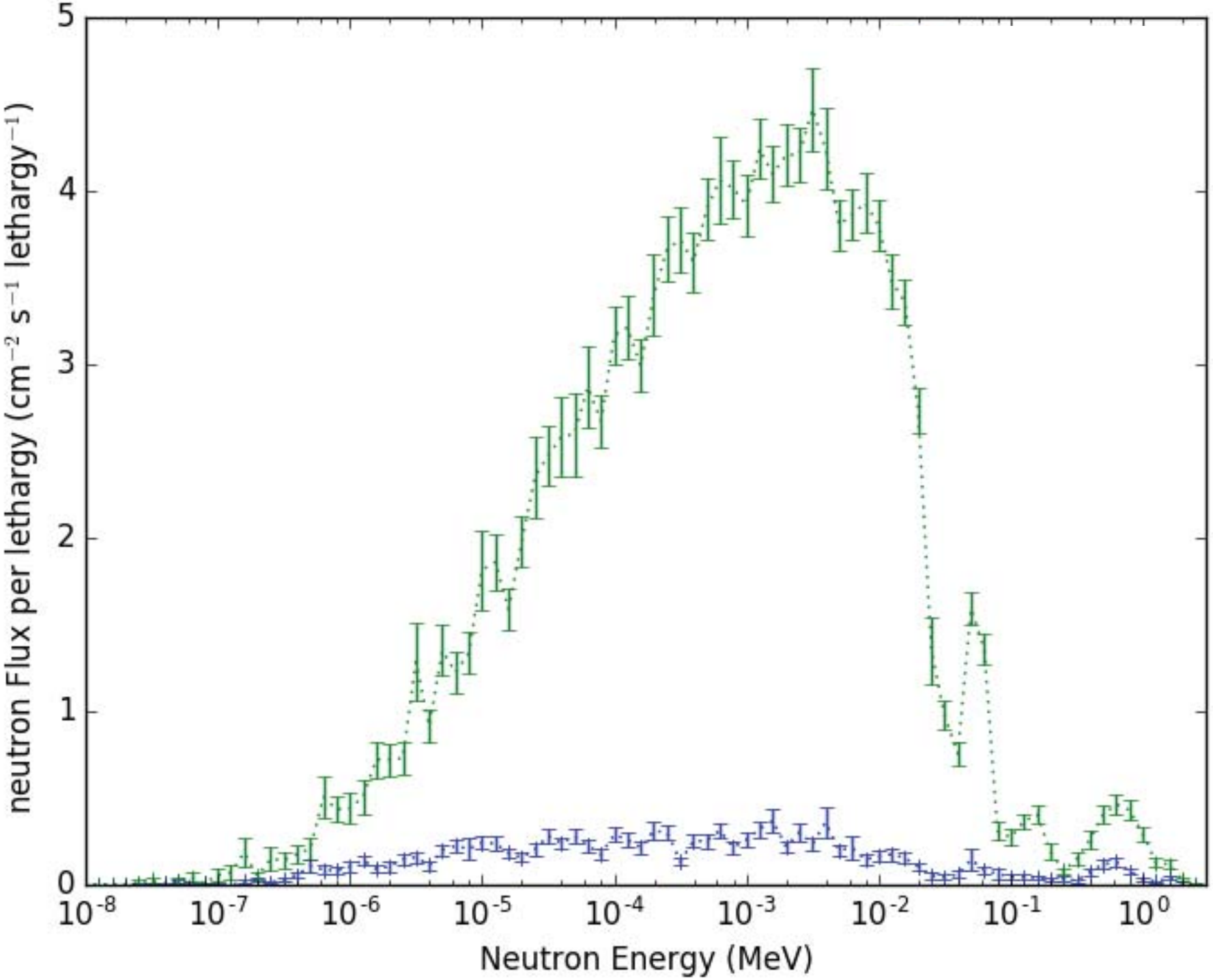


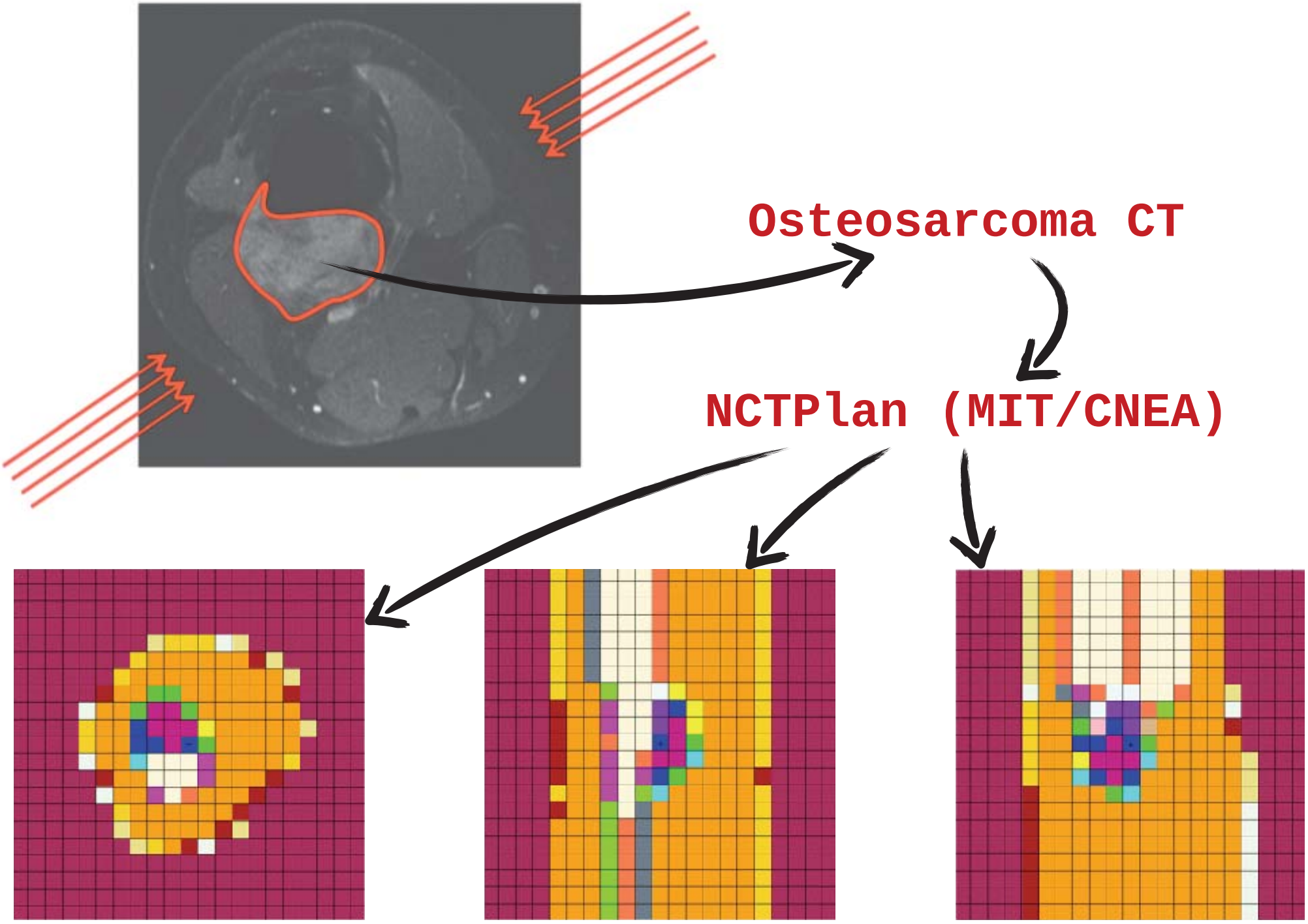

Pb
Grafite
n
p
n
n
n
???
Polietilene
litiato

Neutron Moderation






neutron Flux per lethargy (cm^{-2} s^{-1} lethargy^{-1})
0
1
2
3
4
5
10^{-8}
10^{-7}
10^{-6}
10^{-5}
10^{-4}
10^{-3}
10^{-2}
10^{-1}
10^{0}
Neutron Energy (MeV)


Osteosarcoma CT
NCTPlan (MIT/CNEA)

Treatment Parameters