

Neutron Data Laboratory

Head Prof. DSc Natalia Janeva

Assoc. Prof. Dr – 2

Res. Fellow Dr - 3

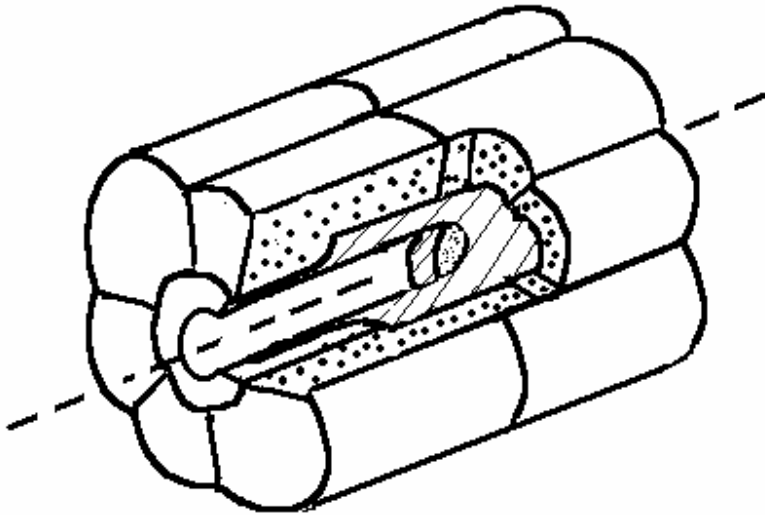
Grad. Phys. – 6

Techn. Ass. - 3

4π - multidetector system ROMASHKA (Daisy) in research reactor building



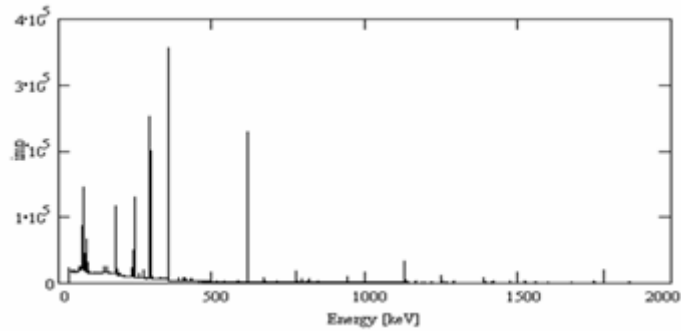
Scintillators of the multidetector system



- 12 scintillators NaI(Tl)
- divided on two halves of 6 crystals
- special shape (like a flower Daisy)
- the crystals volume in total 16.6 l NaI(Tl)
- placed in a cylinder with the outside diameter 30 cm

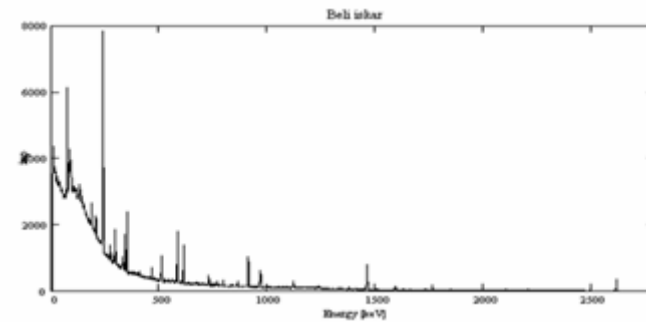
U - ore

HPGe detector, counting time $T = 72000$ s

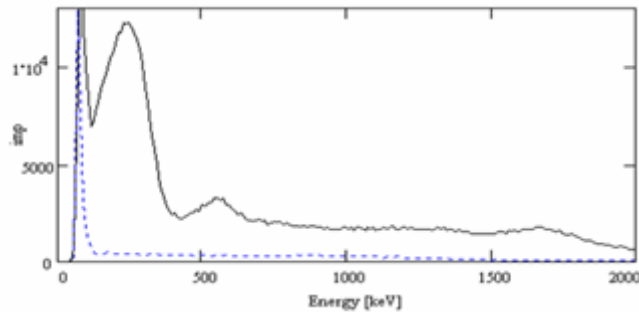


Fe - ore

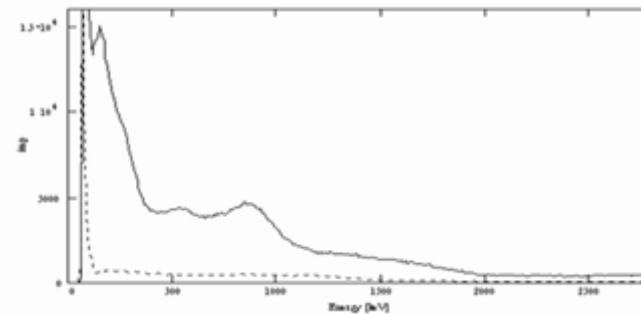
HPGe detector, counting time $T = 144000$ s



Romashka, counting time $T = 800$ s



Romashka, counting time $T = 1200$ s

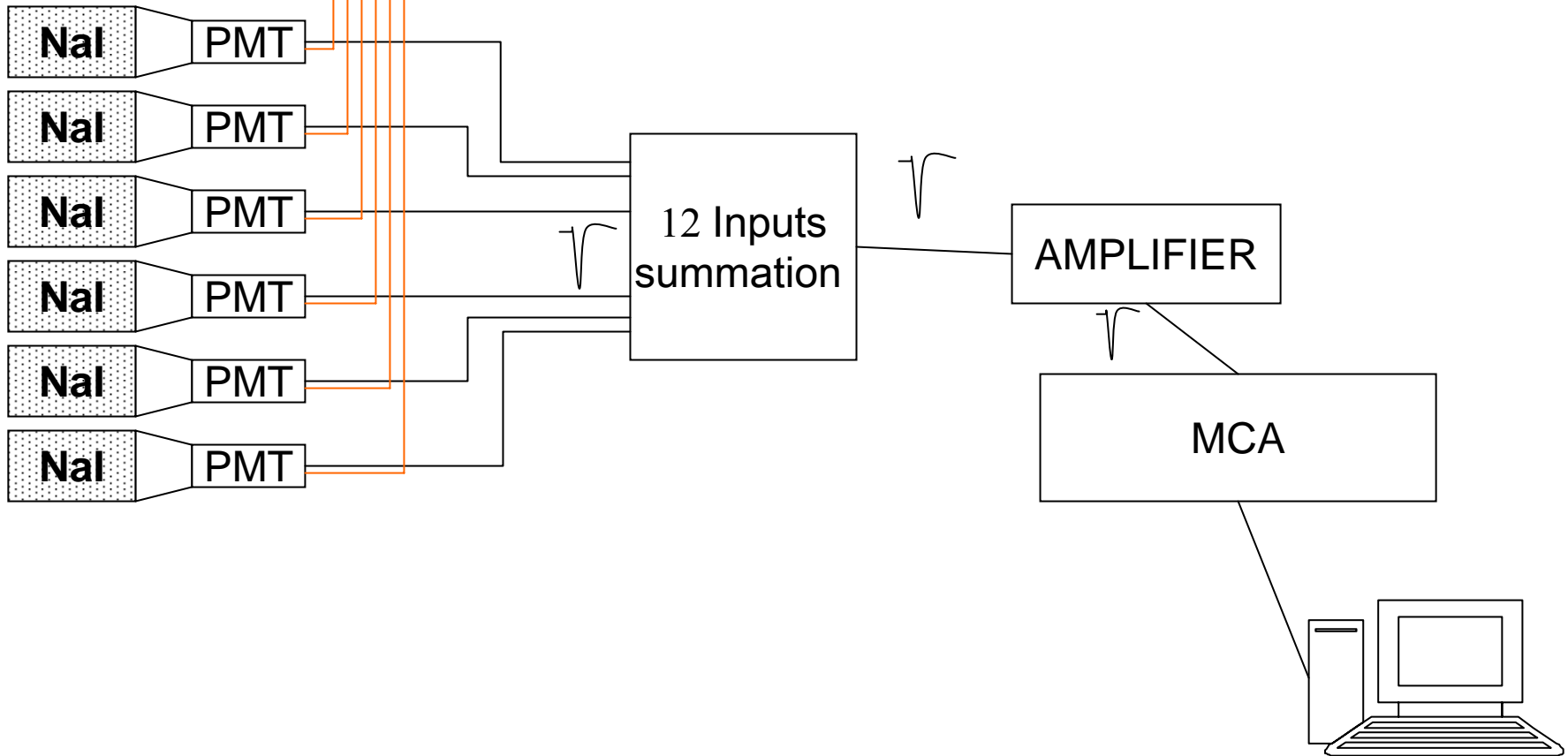


The 4π -multidetector system Romashka in express analysis of polluted soil samples
? Improvement of sample preparation ?

HVS

HV distribution device

Existing
 4π – multi detector
system setup



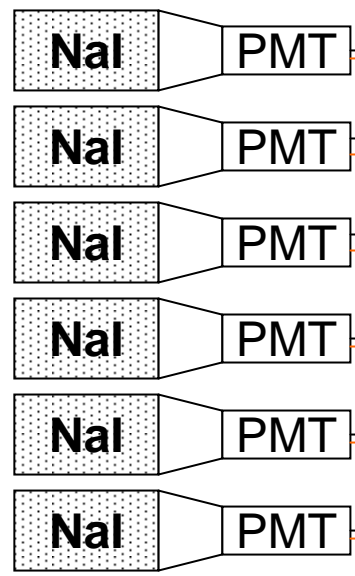
Electronics improvement



HVS

HV distribution device

- 1a,1b: Fan in/Fan out
- 2 : Coincidence
- 3 : Linear gate
- 4 : Amplifier
- 5 : ADC



$\sqrt{}$

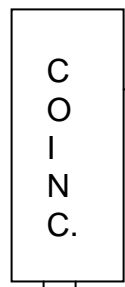
1a



1b



2



3



4



5



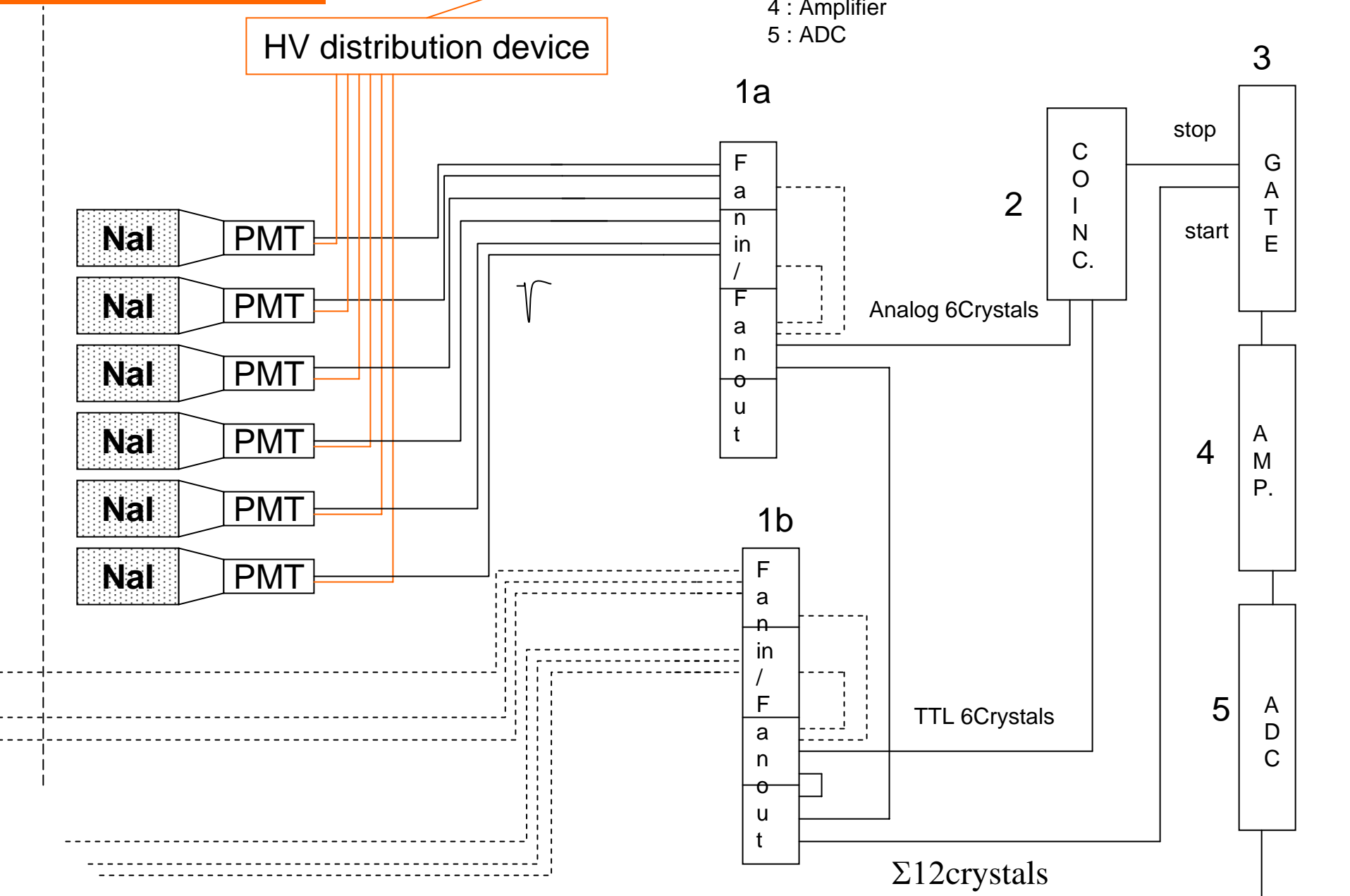
Analog 6Crystals

TTL 6Crystals

Σ 12crystals

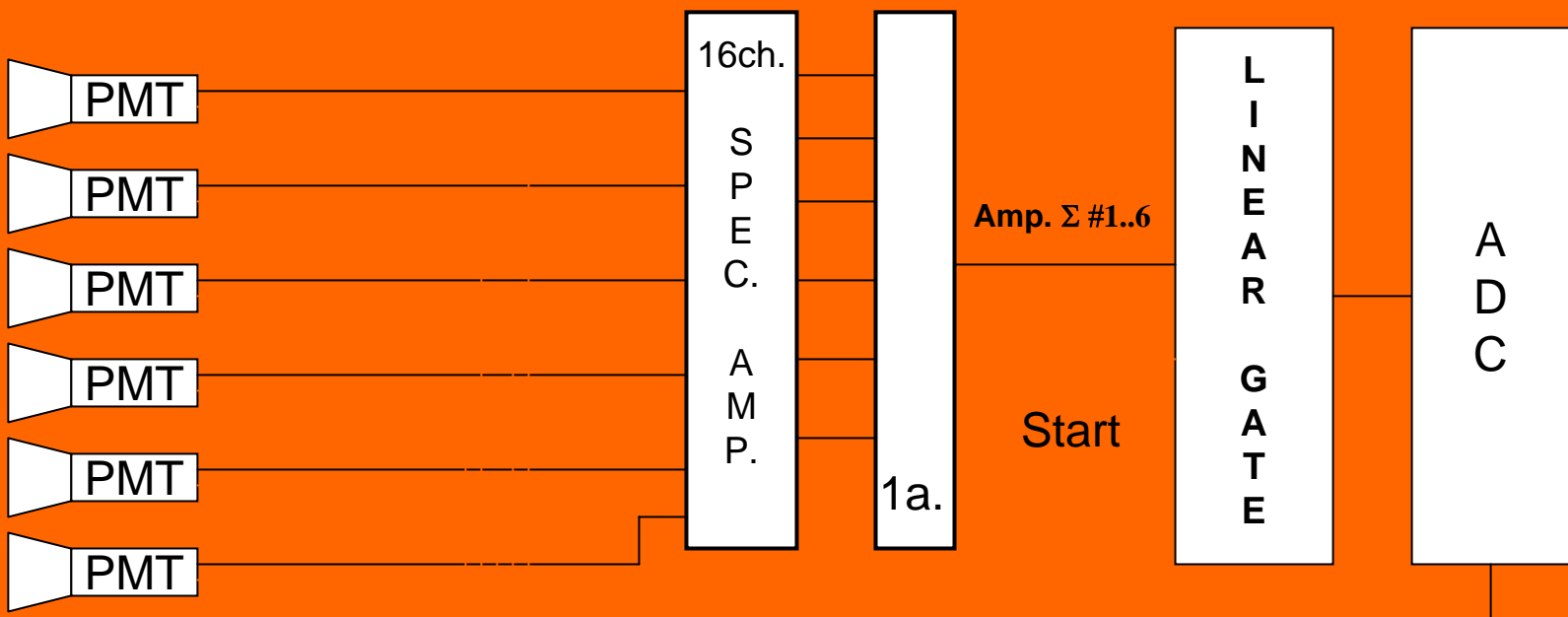
stop

start



???

~18K\$



Amplitude chain



- 1a., 1b. - Quad Linear Fan in/Fan out
- 2. - 16 Ch. Spec. Amp.
- 3. - Linear Gate
- 4. - ADC
- 5. - Coninc. Unit

Collaboration with JINR – Dubna - Resonance neutron cross sections measurement and evaluation

- Nuclear Data for ^{235}U , ^{238}U and ^{239}Pu in the Unresolved Resonance Region
A.A. Vankov, V.F. Ukraintsev, N. Janeva, S. Toshkov and A. Mateeva
Nuclear Science and Engineering, 96, 122-136 (1987)
- A setup for precise measurement of resonance neutron capture by self-indication
N. Janeva, S. Toshkov, G.V. Muradyan, Yu.V. Grigorjev, G. Georgiev, I. Sirakov, V.G. Tishin and Yu.S. Zamjatnin
Nucl. Instr. and Meth. in Phys. Res. A313 (1992) 266-272
- Determination of ^{147}Sm and ^{148}Sm resonance parameters
G. Georgiev, Yu.S. Zamjatnin, L.B. Pikelner, G.V. Muradyan, Yu.V. Grigorjev, T. Madjarski, N. Janeva
Nucl. Phys. A565 (1993) 643-656

Thick sample transmission and self-indication measurements

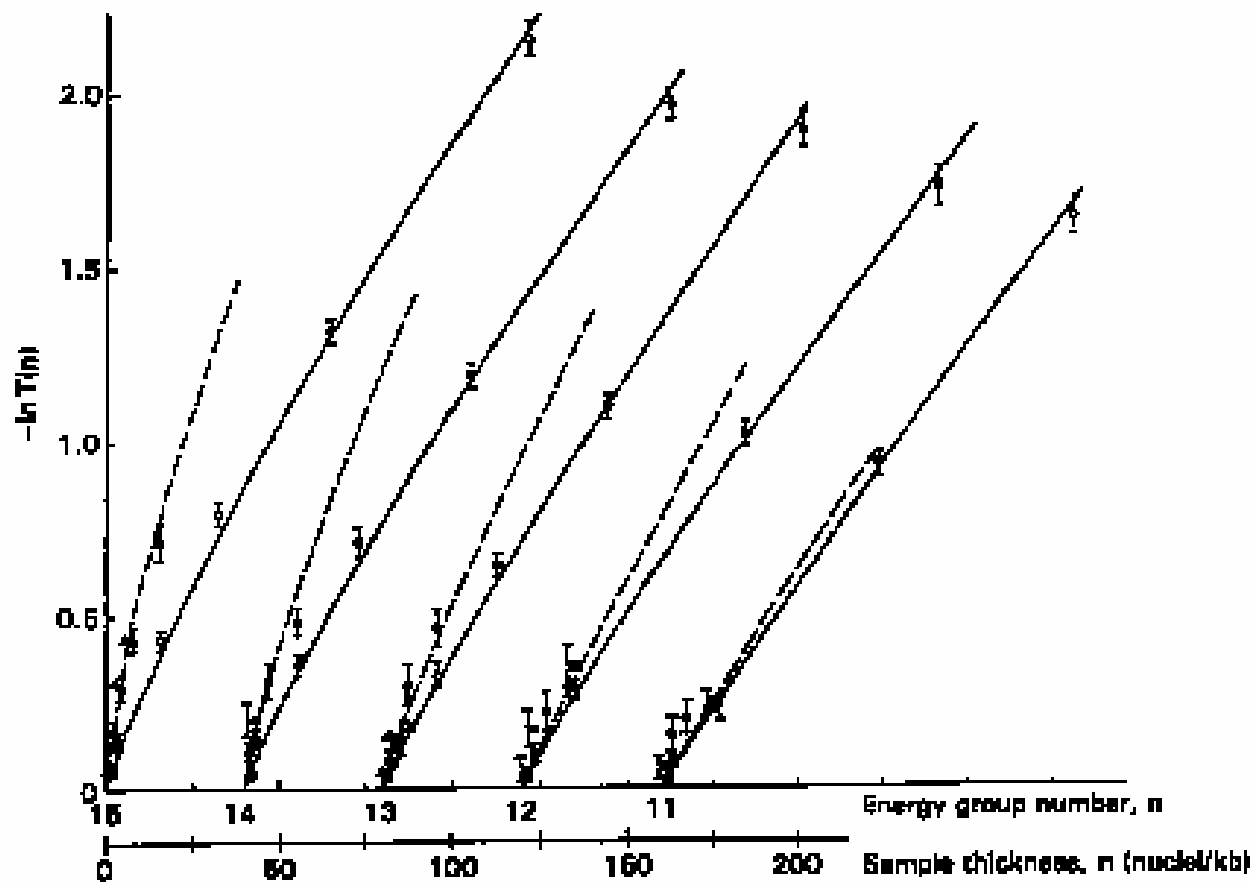


Fig. 1. Transmission $T(n)$ (solid curves) and self-shielding $T_s(n)$ for ^{238}Pu (dashed curves) in 26 energy groups in comparison with data from other experiments³.

Collaboration with JRC – IRMM
measurements and evaluation of ^{232}Th resonance cross
sections structure
IAEA coordinated research project: Th-U fuel cycle

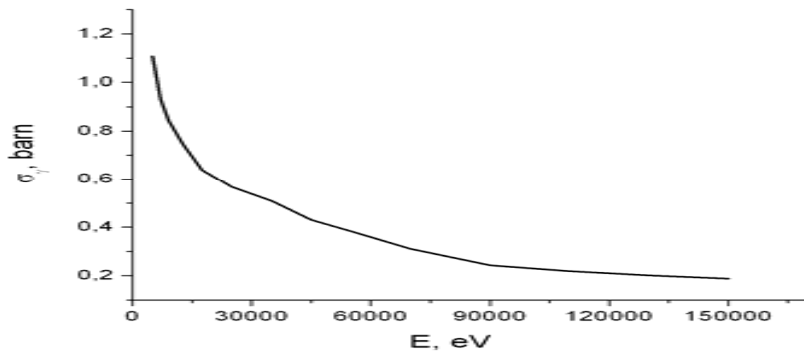
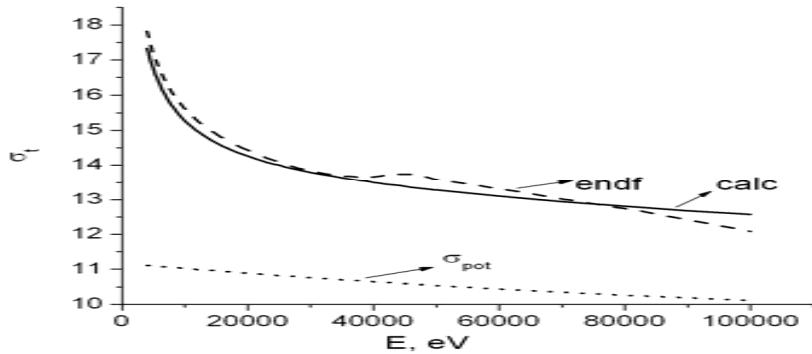
A. Borella, K. Volev, A. Brusegan, G. Lobo, P.
Schillebeeckx, F. Corvi, N. Koyumdjieva, N.
Janeva, A.A. Lukyanov,

Determination of the $^{232}\text{Th}(n,\gamma)$ Cross Section
from 4 to 140 keV at GELINA,

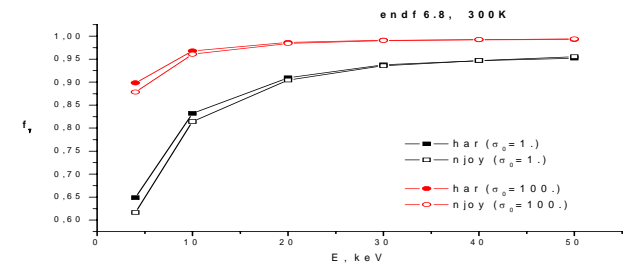
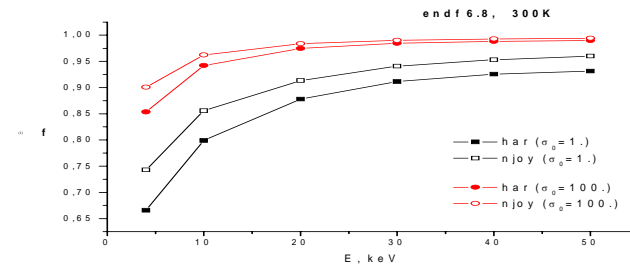
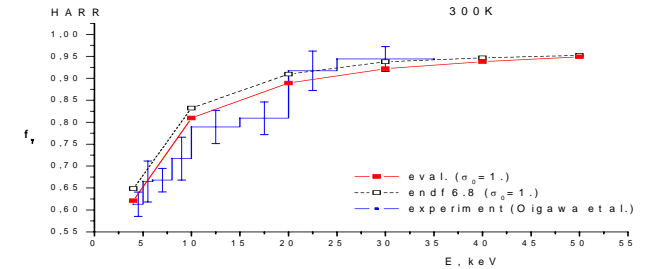
Nucl. Sci. Eng., accepted for publication

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P. Schillebeeckx²

Average Cross Sections



Self-shielding Factors



²³²Th average resonance parameters

$R = 9.43/\text{fm}$, $s_0 = 0.94(\times 10^{-4})$, $s_1 = 1.96(\times 10^{-4})$, $s_2 = 1.24(\times 10^{-4})$

EUROTRANS

EUROpean Research Programme for the
TRANSmutation of High Level Nuclear Waste
in an Accelerator Driven System

