

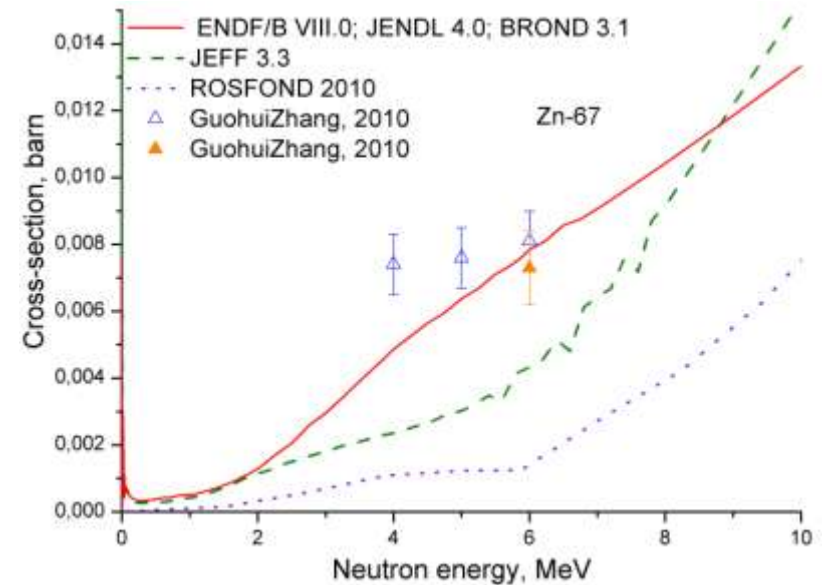
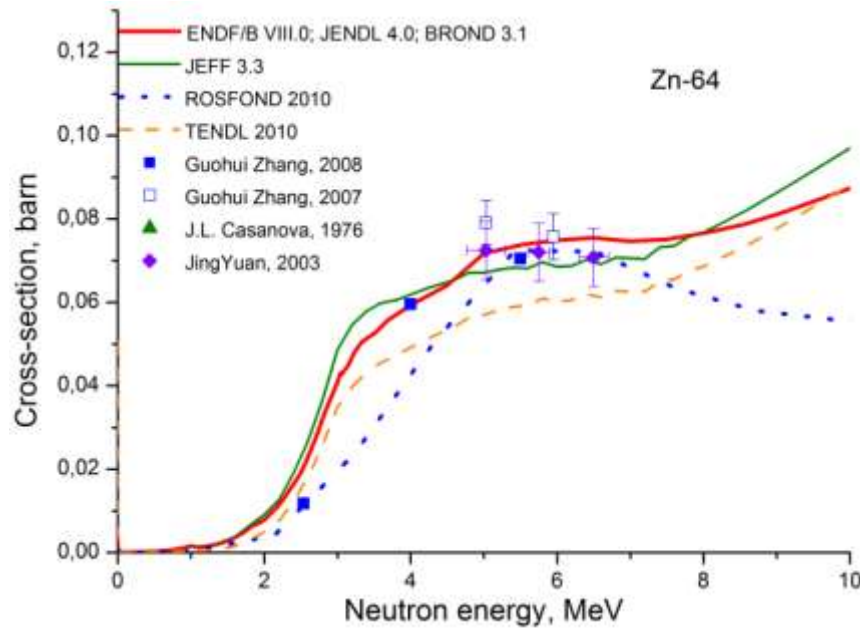
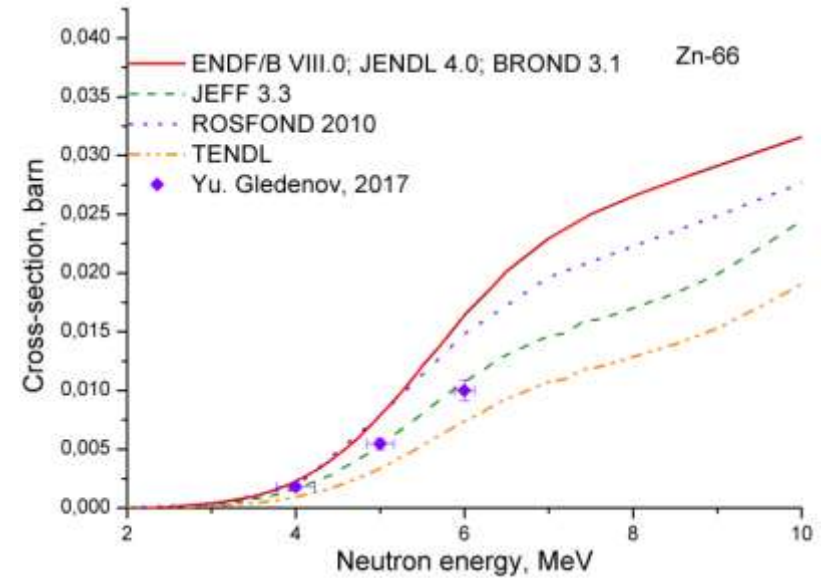
Investigation of (n,a) reaction excitation function for zinc isotopes.

Khromyleva T.A., Bondarenko I.P., Gurbich A.F., Prusachenko P.S., Sergachev A.I., Khryachkov V.A.

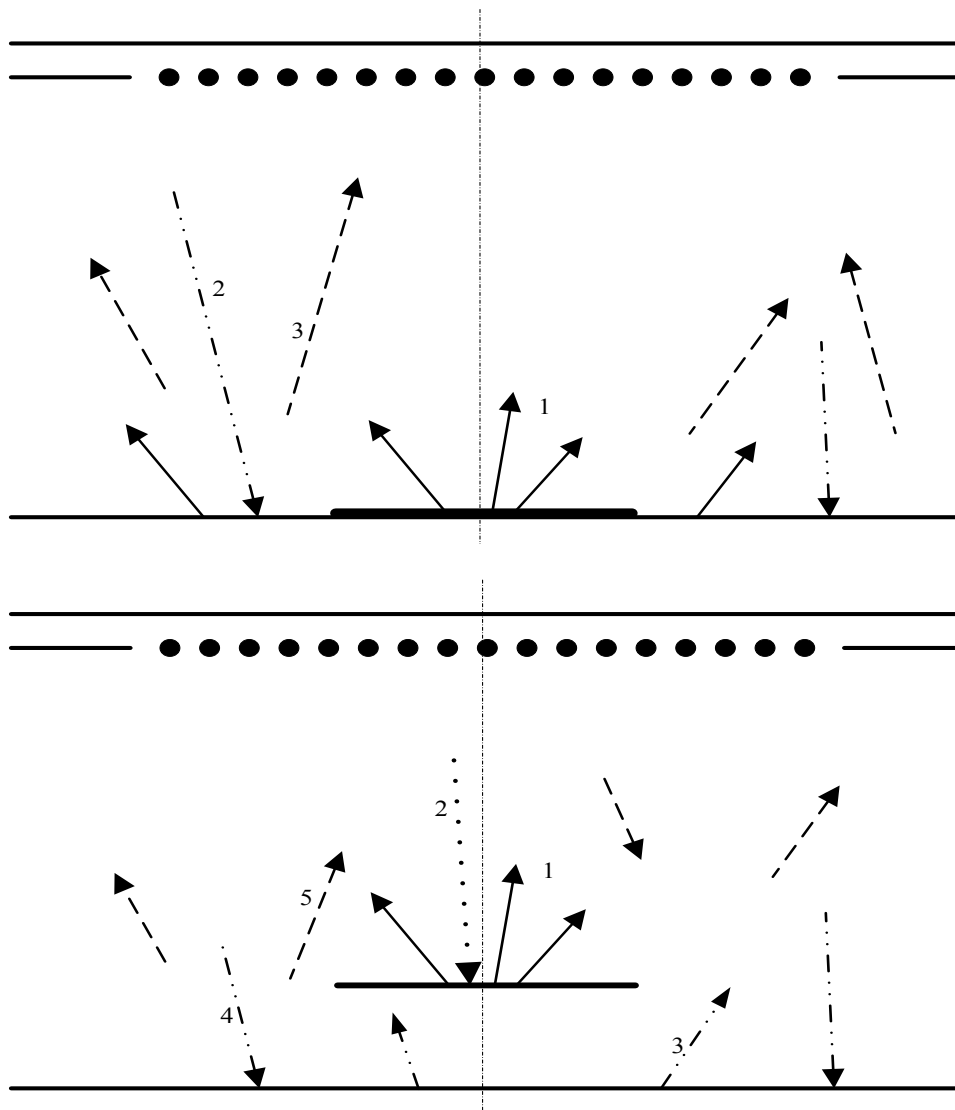
IPPE, Obninsk

Current state of experimental data and evaluations

Isotop	In composition, %	Q, MeV
^{64}Zn	48,6	3,8637
^{66}Zn	27,9	2,2597
^{67}Zn	4,1	4,8648
^{68}Zn	18,8	0,7648
^{70}Zn	0,6	-0,1756



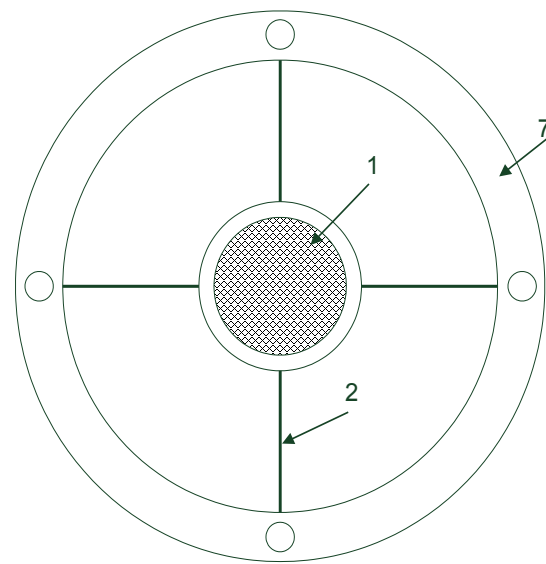
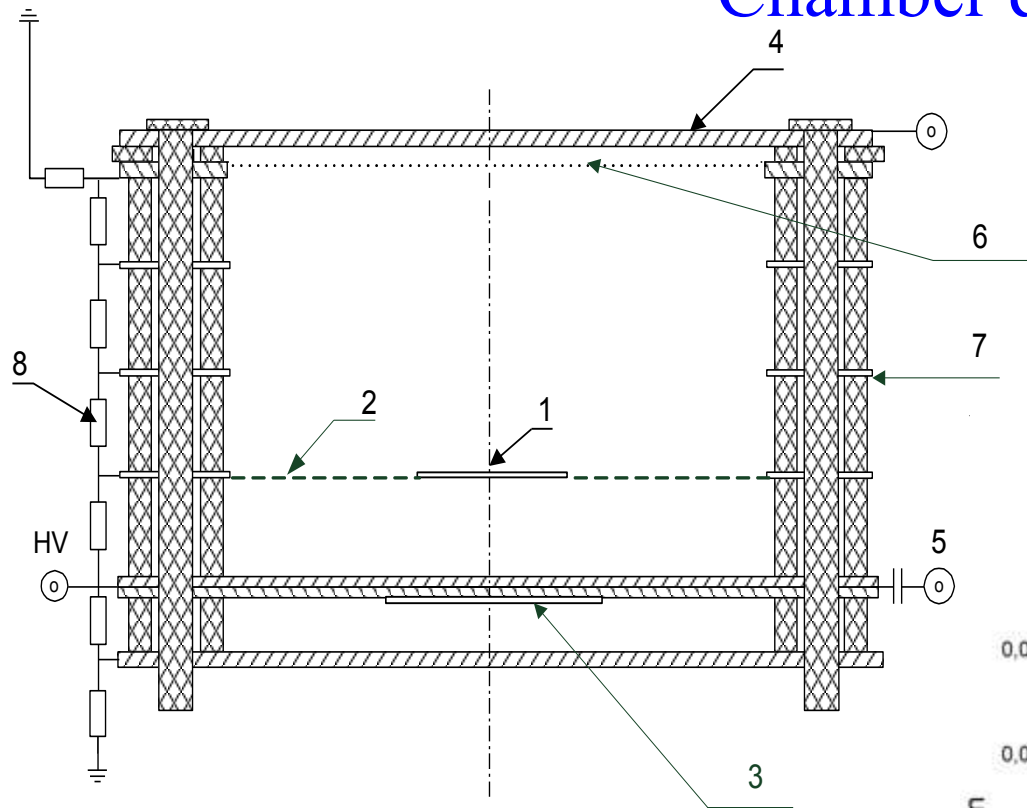
Specific of particles registration from target placed on cathode and spaced



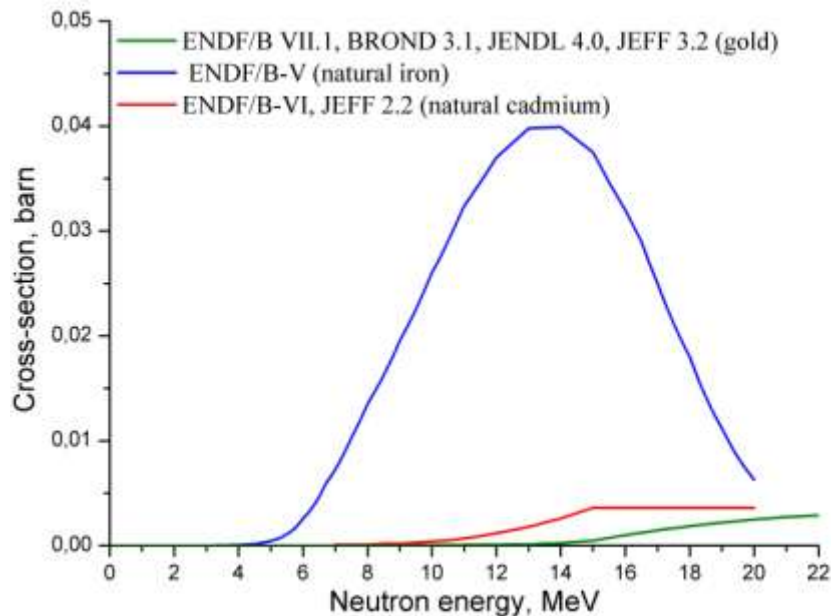
- 1 – cathode born α -particles
- 2 – false cathode born α -particles
- 3 – gas born α -particles

- 1 – target born particles
- 2 – false target born particles
- 3 – cathode particles
- 4 – false cathode particles
- 5 – gas born particles

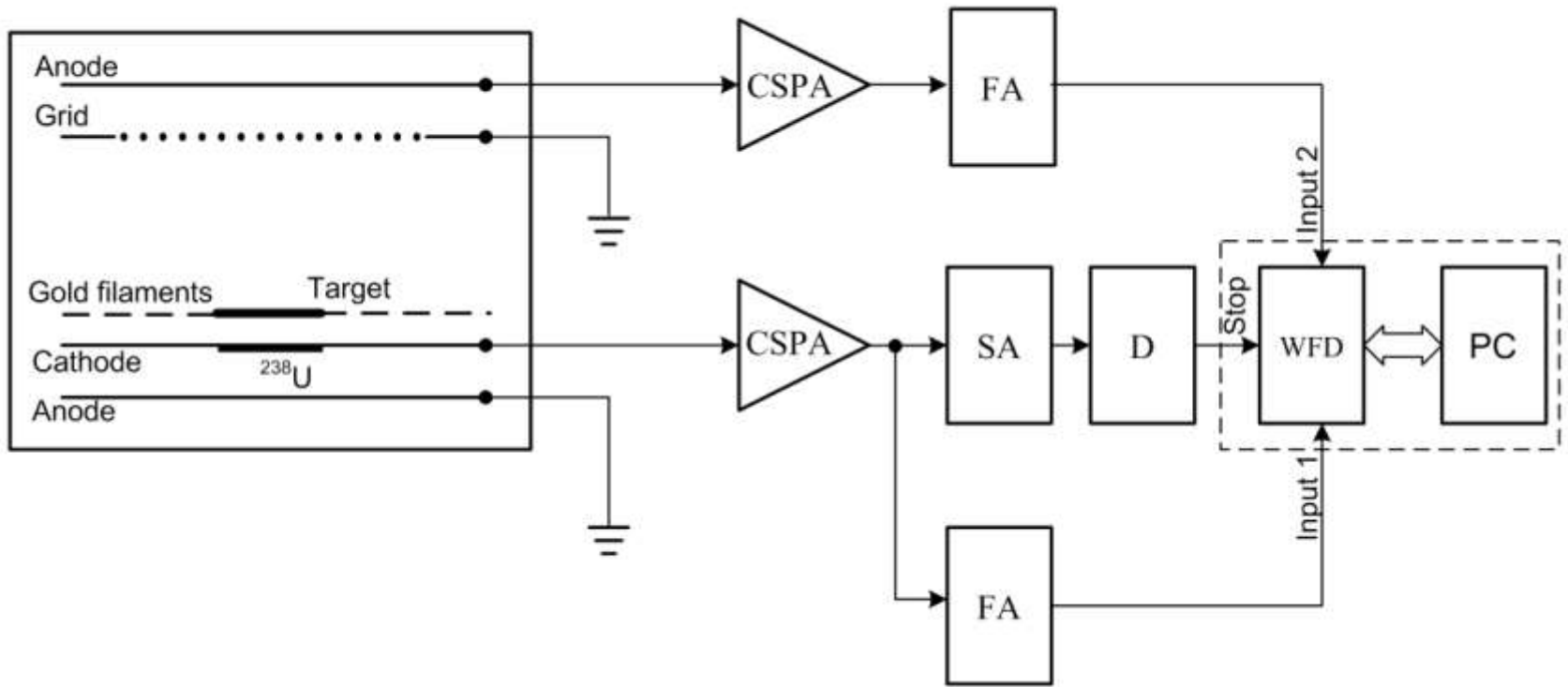
Chamber design



- 1 – solid target;
- 2 – golden wires;
- 3 – ^{238}U target;
- 4 – IC anode;
- 5 – common cathode (gold cover to main ch.);
- 6 – Frisch grid;
- 7 – guard electrodes;
- 8 – resistive voltage divider

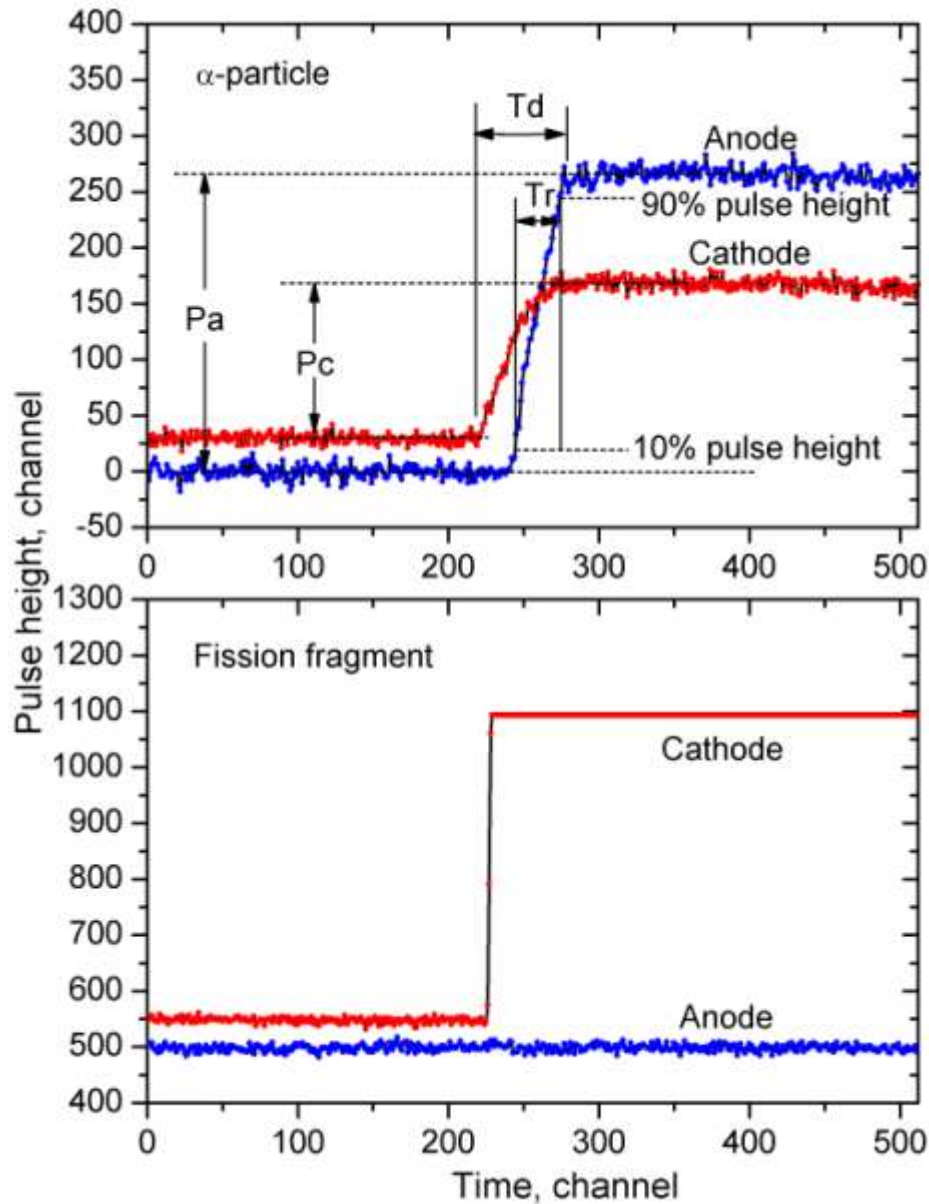


Block diagram of the detector and electronics



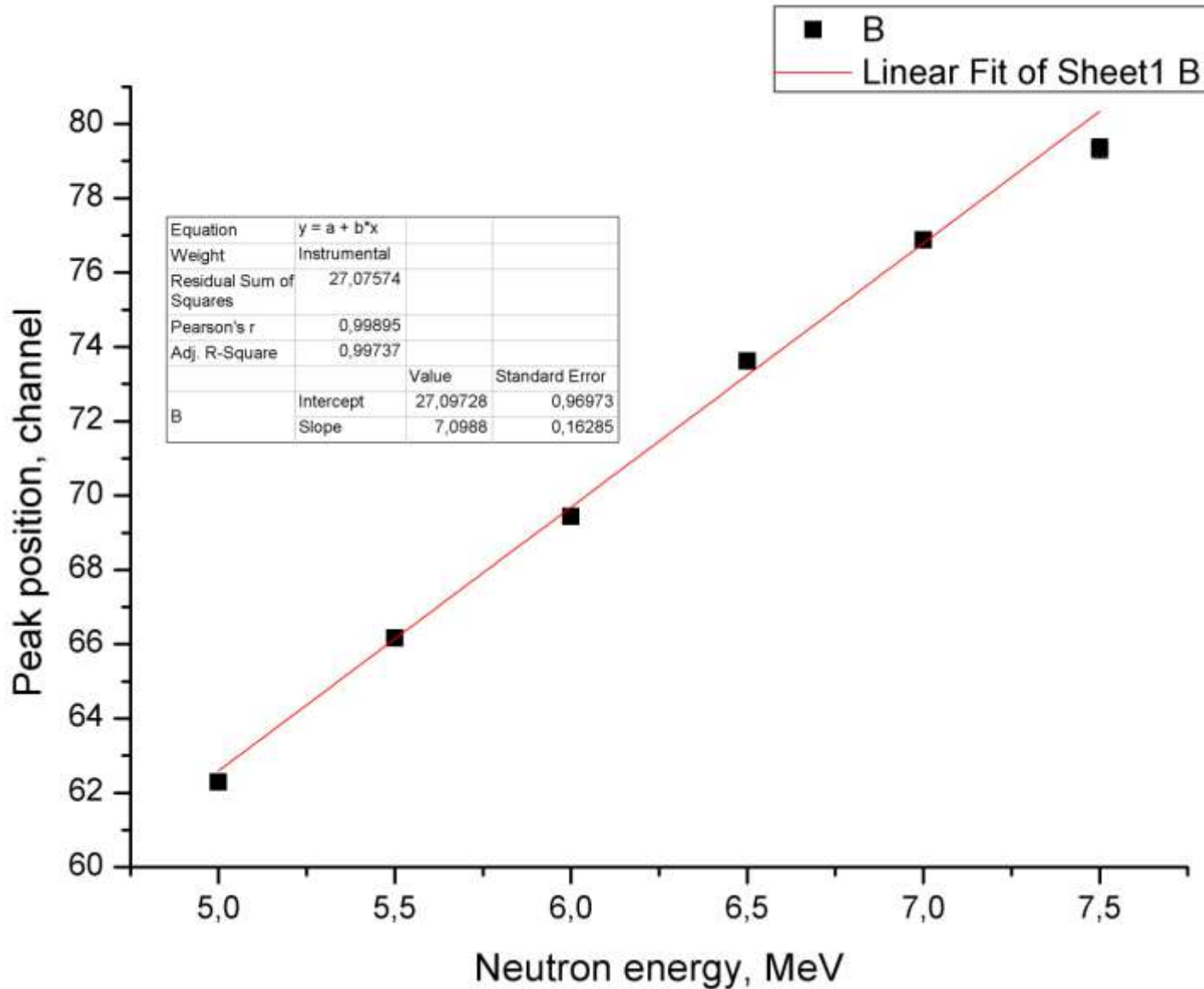
CSPA – charge sensitive preamplifier;
SA – spectrometric amplifier;
D – discriminator;
WFD – waveforms digitizer;
FA – fast amplifier

Information from signals of ionization chamber

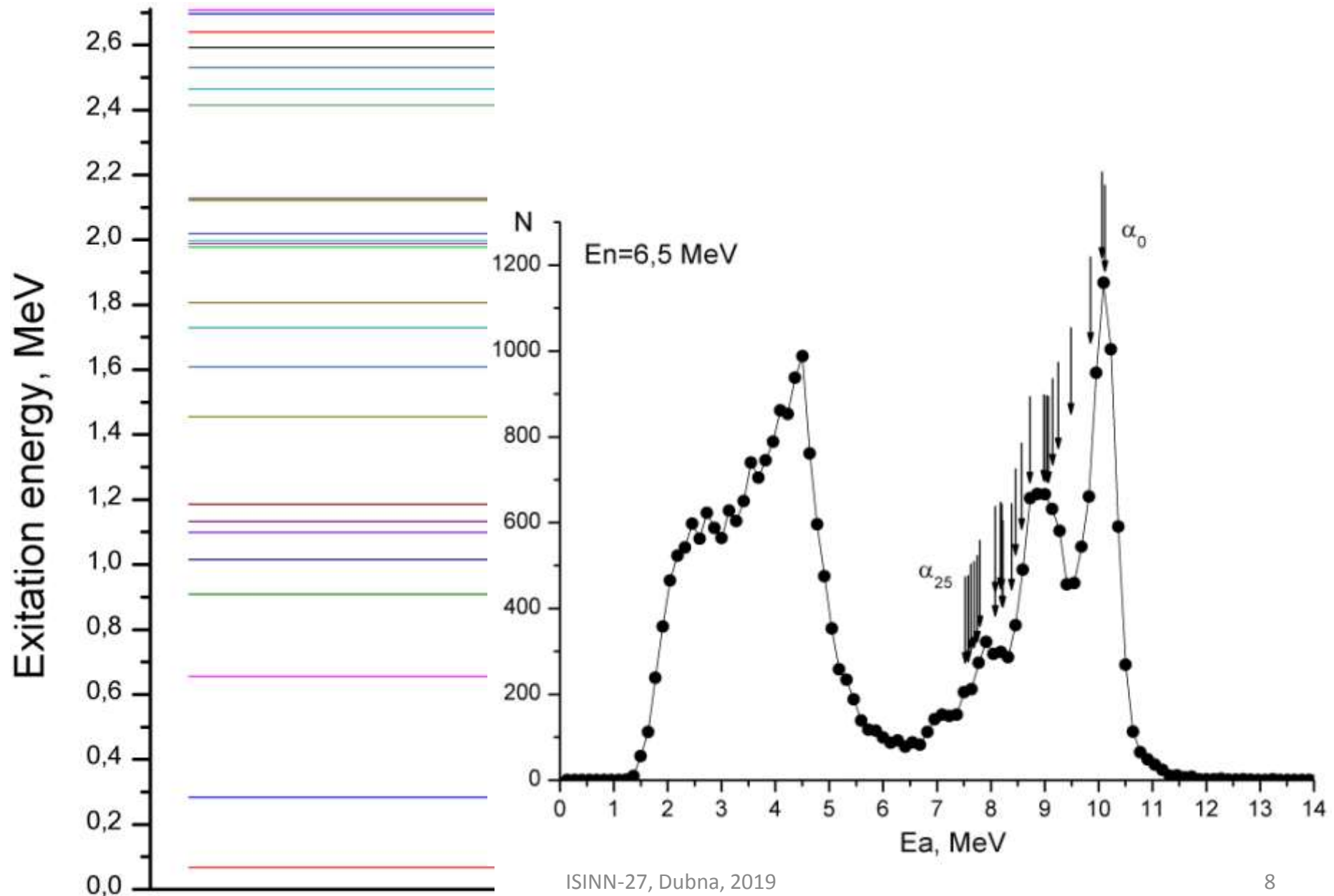


- Anode pulse height P_A
- Cathode pulse height P_C
- Anode pulse start time T_{SA}
- Cathode pulse start time T_{SC}
- Anode pulse saturation moment T_{EA}
- Drift time $T_d = (T_{EA} - T_{SC})$
- Anode pulse rise time $T_r = (T_{EA} - T_{SA})$
- Maximum distance from anode to beginning (end) of the track $X = (D - T_d * v_e)$
- Length of registered particle track projection to chamber axis ($R_x = T_r * v_e$)

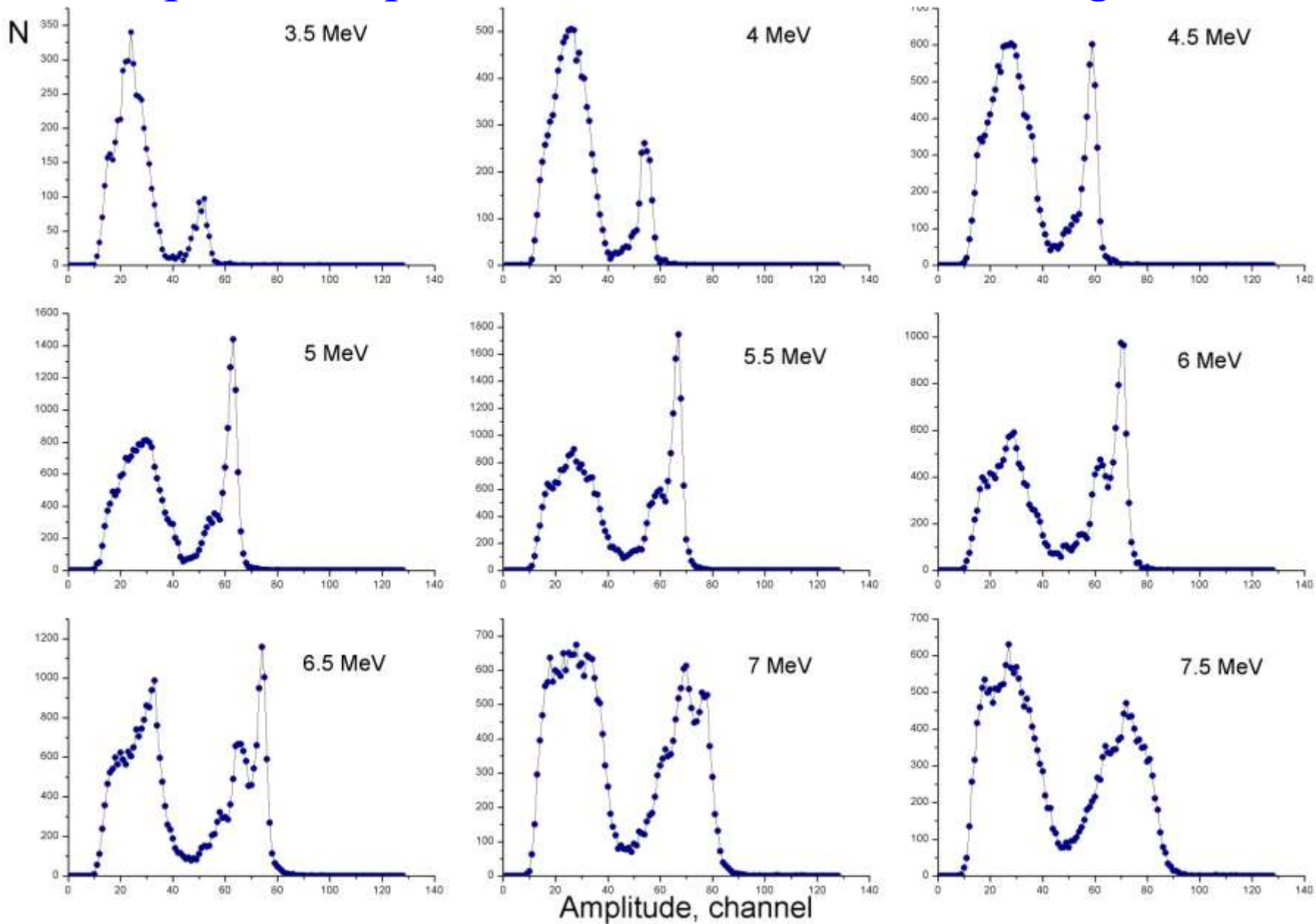
Direct Q-value determination of investigating (n, α) reaction



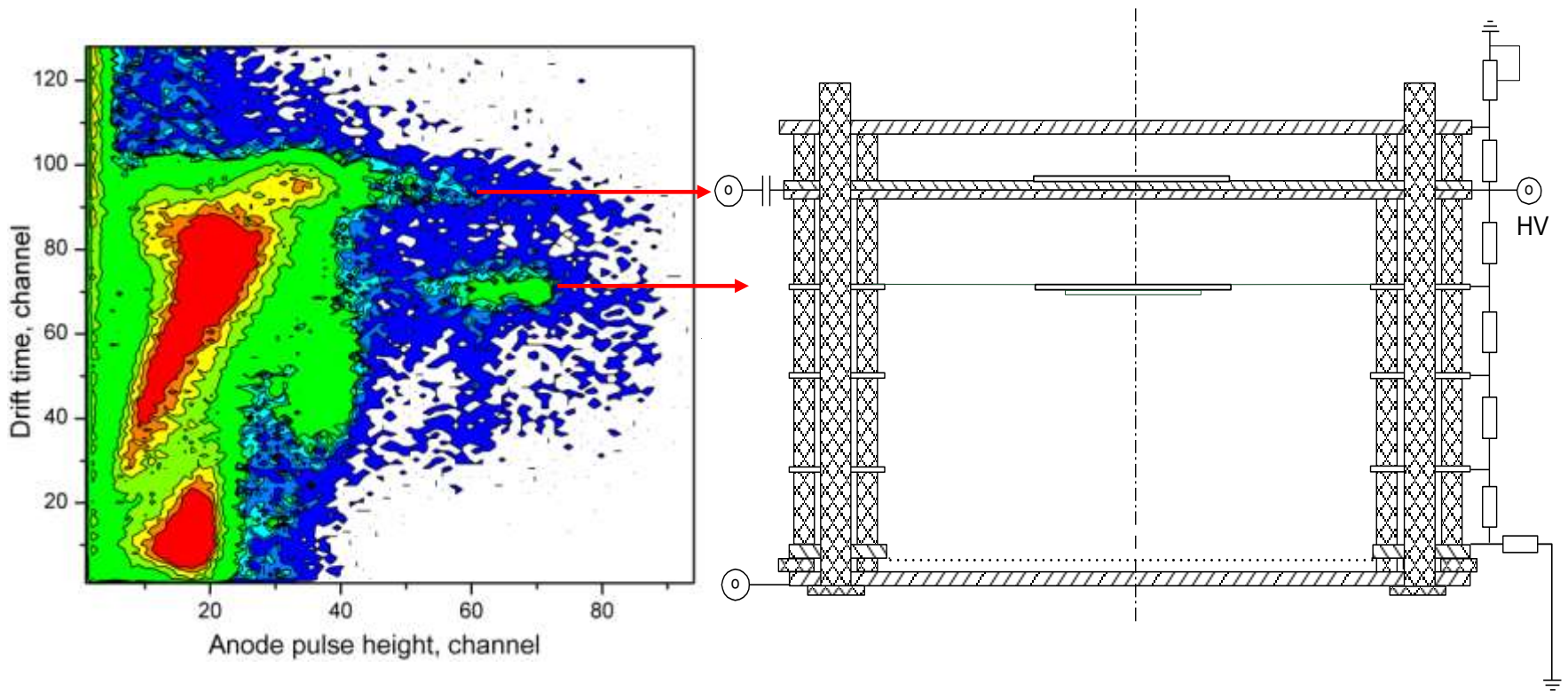
Excitation levels and its input in spectrum



α -particles spectra for different neutron energies

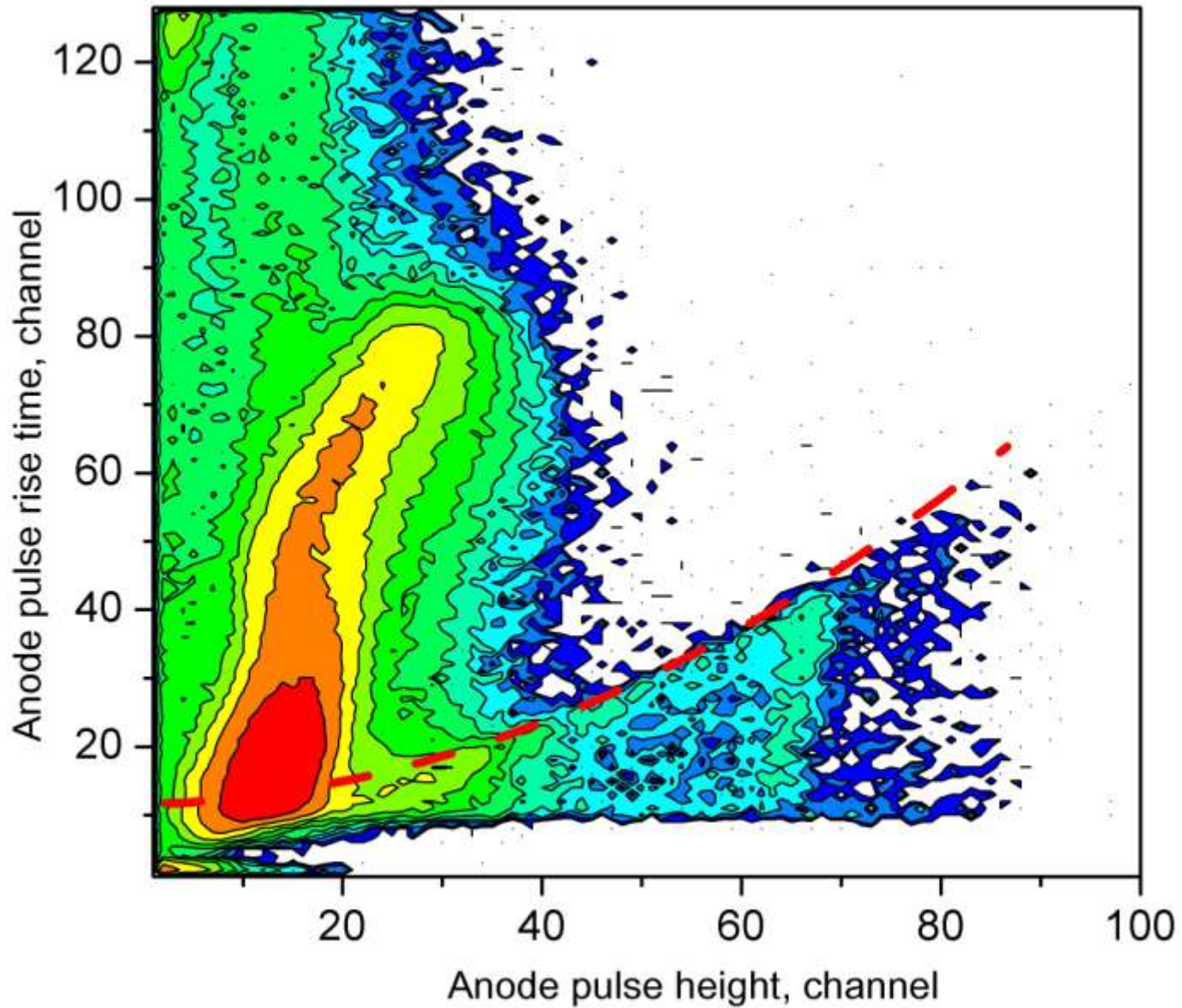


Events selection by drift time parameter

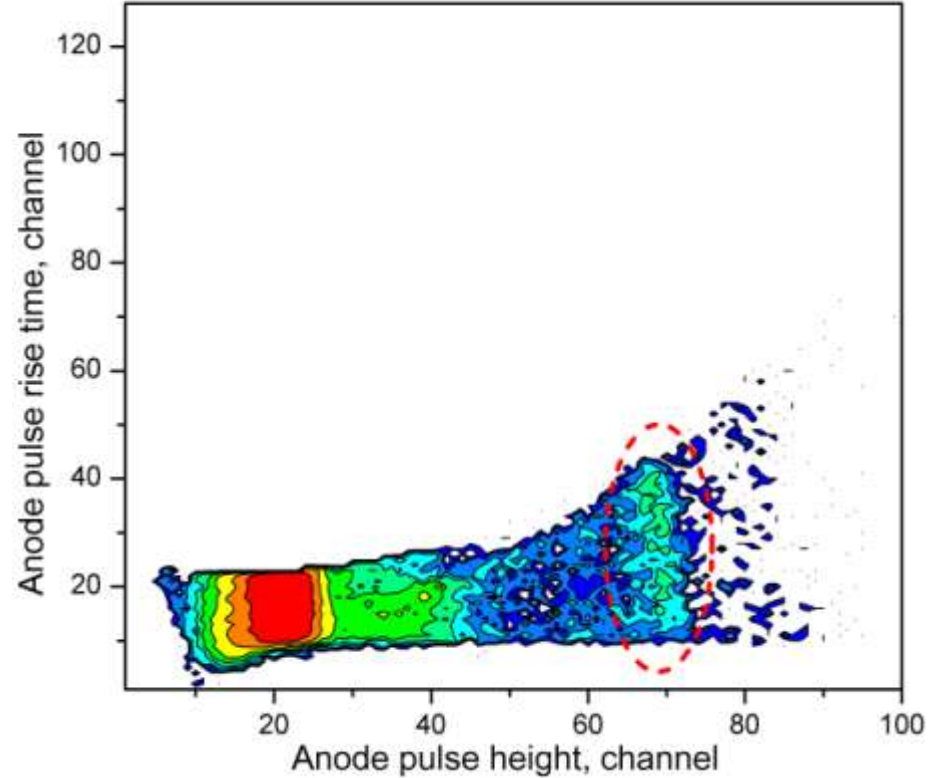
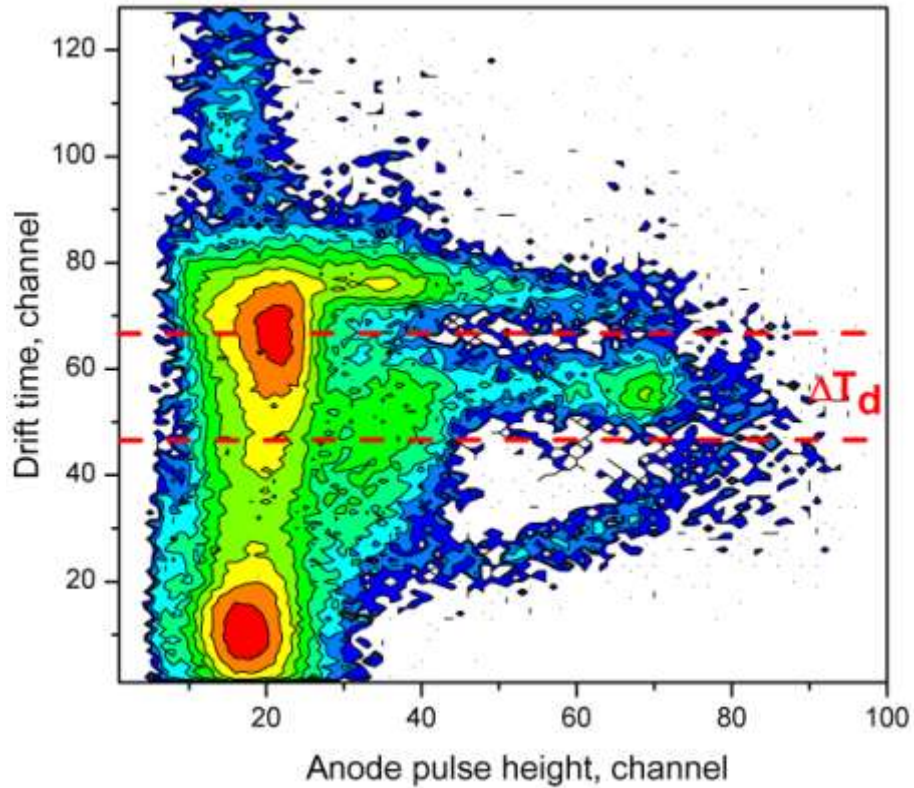


Each drift time corresponds to particular element (place) in chamber. Signal analysis by this factor allows to suppress background by separating investigating events on target from events on other elements of chamber.

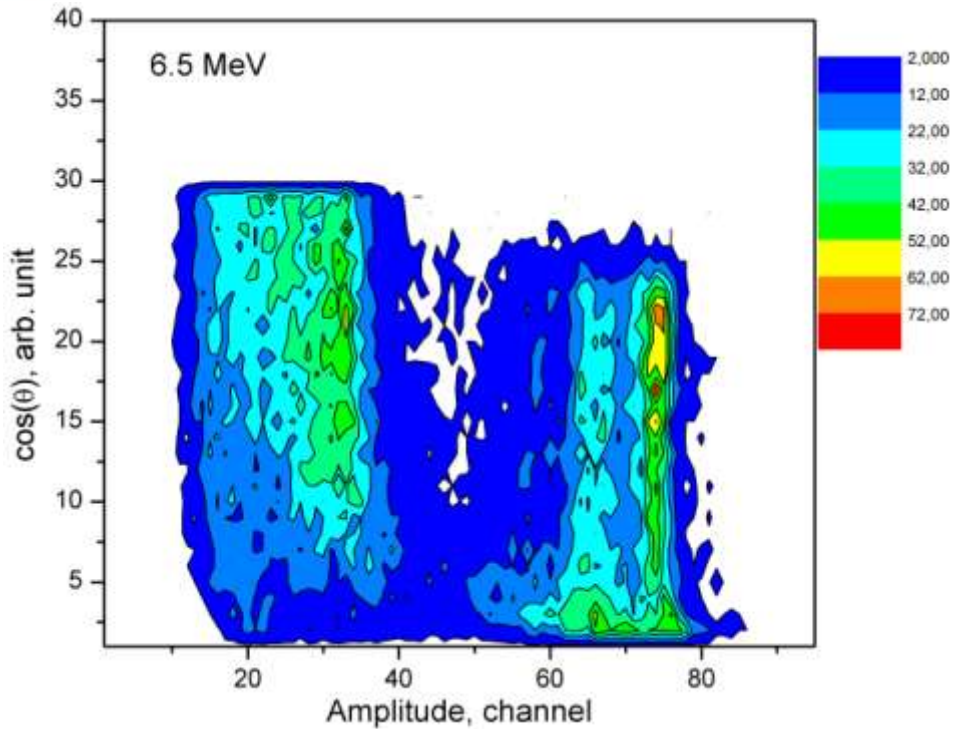
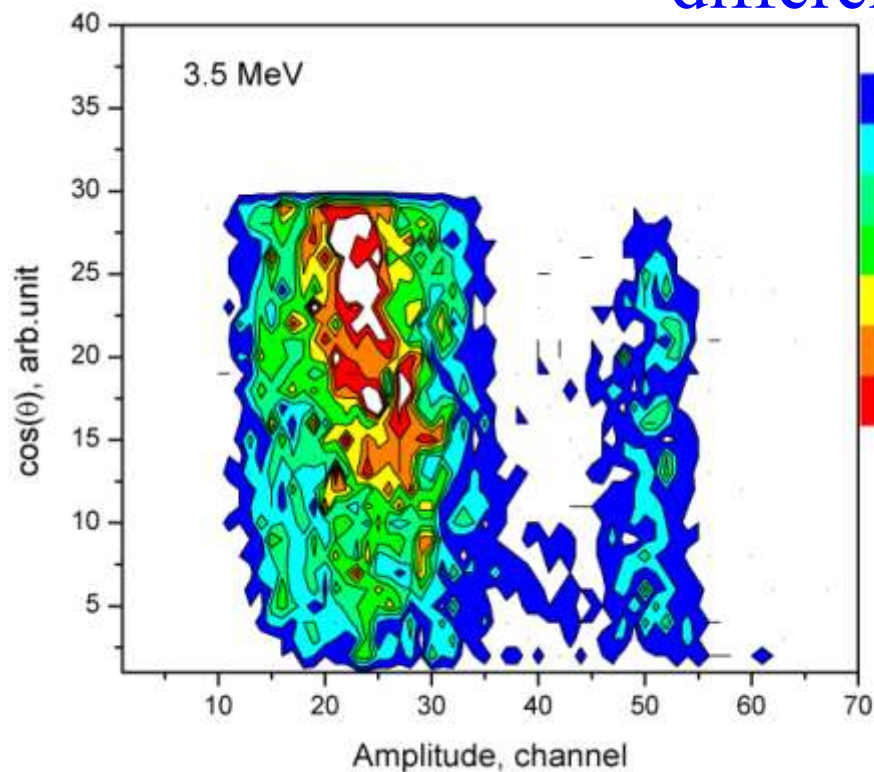
Events selection by signal rise time parameter



Background suppression



Background suppression in α -particles emission angle for different energies

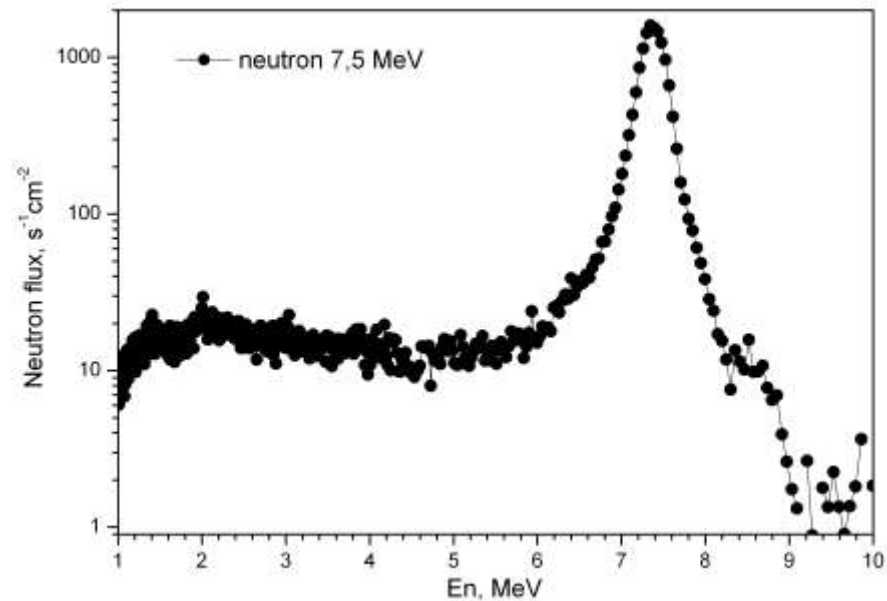
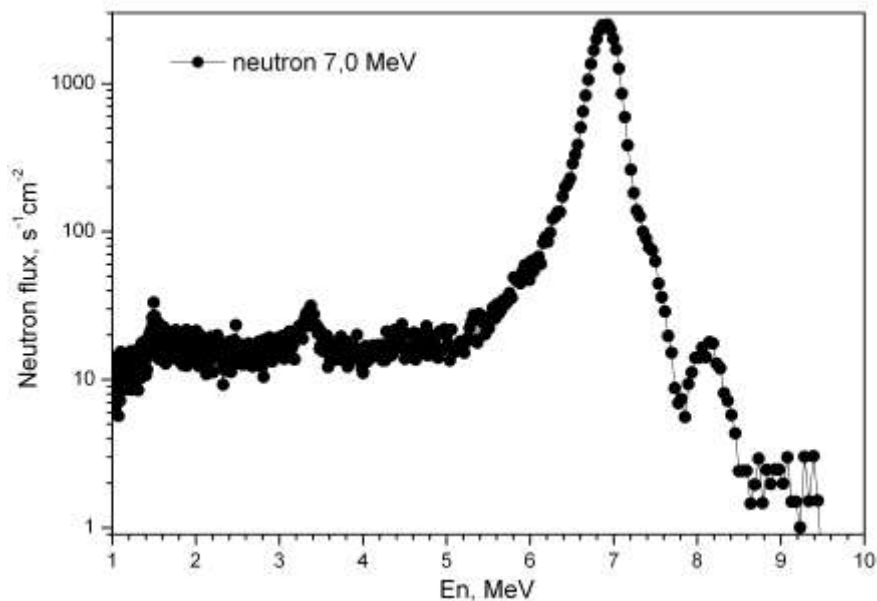
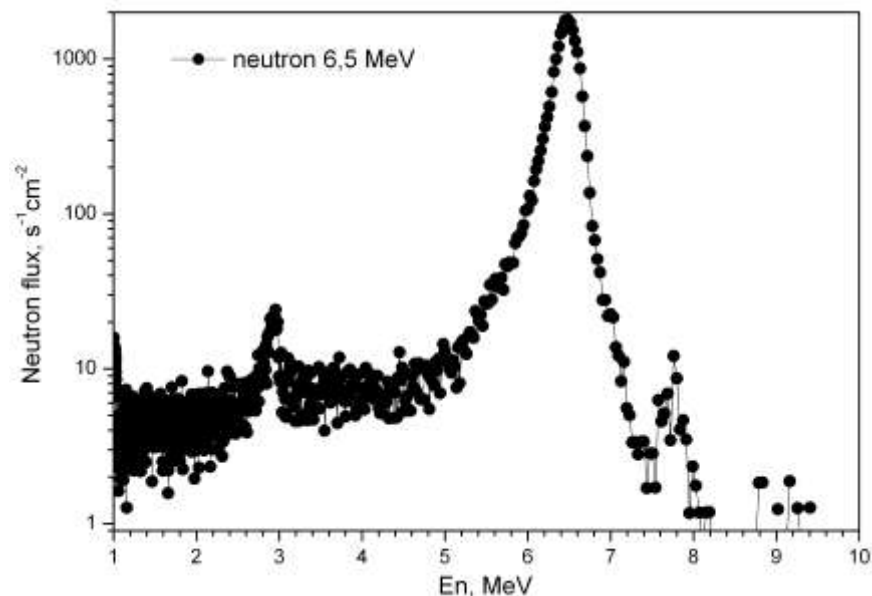
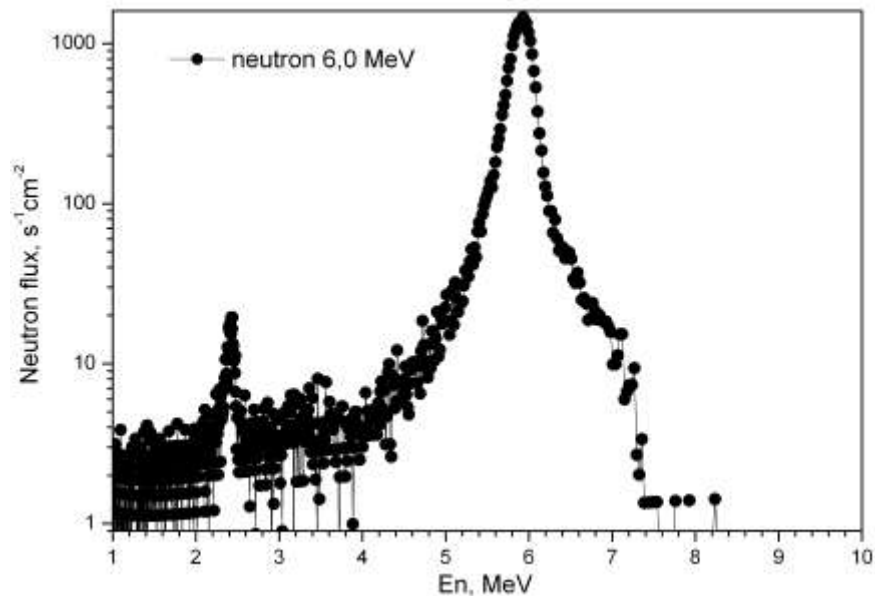


Tandetron accelerator

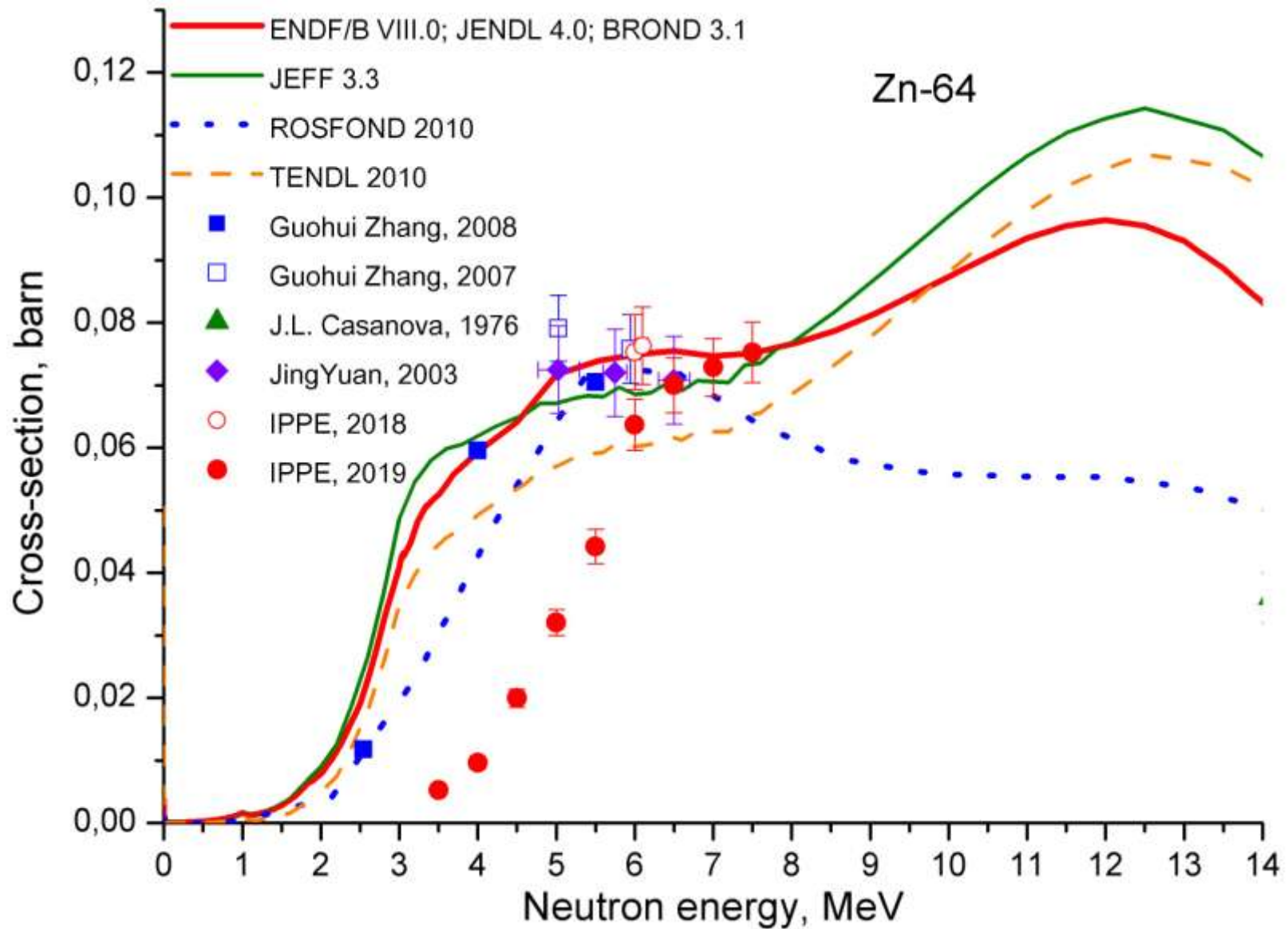


The main parameters	Accelerator IG-1	New accelerator Tandetron
Neutrons energy	Max 7,2 MeV	Max 9 MeV
Value of current	5 - 7 μA	max 50 μA - H^+ max 20 μA - D^+
Accelerated ions	H^+ , D^+	from H^+ to gold ions
Impulse beams	-	It is possible to obtain impulse beams H^+ , D^+ and He^{2+} . The average pulse width is 1 ns.

Neutron spectra from $D(d,n)^3\text{He}$ for main neutron energies.



Experimental determination of (n, α) reaction cross-section



Thank you
for your attention