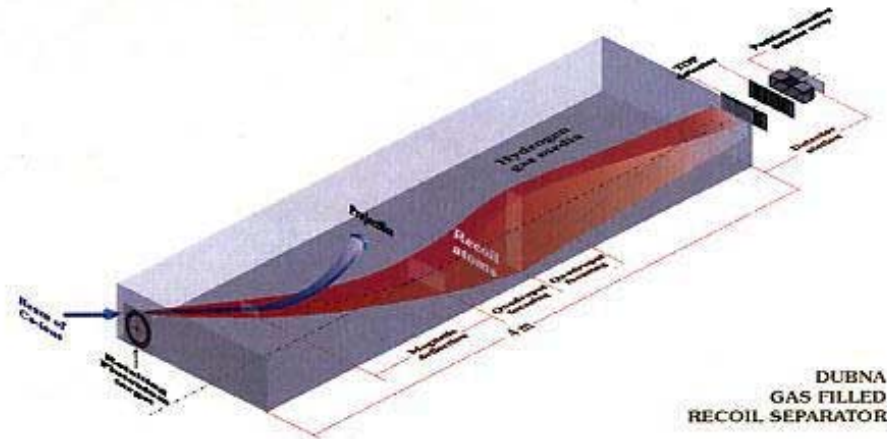


Status Report on the Dubna Gas-Filled Recoil Separator

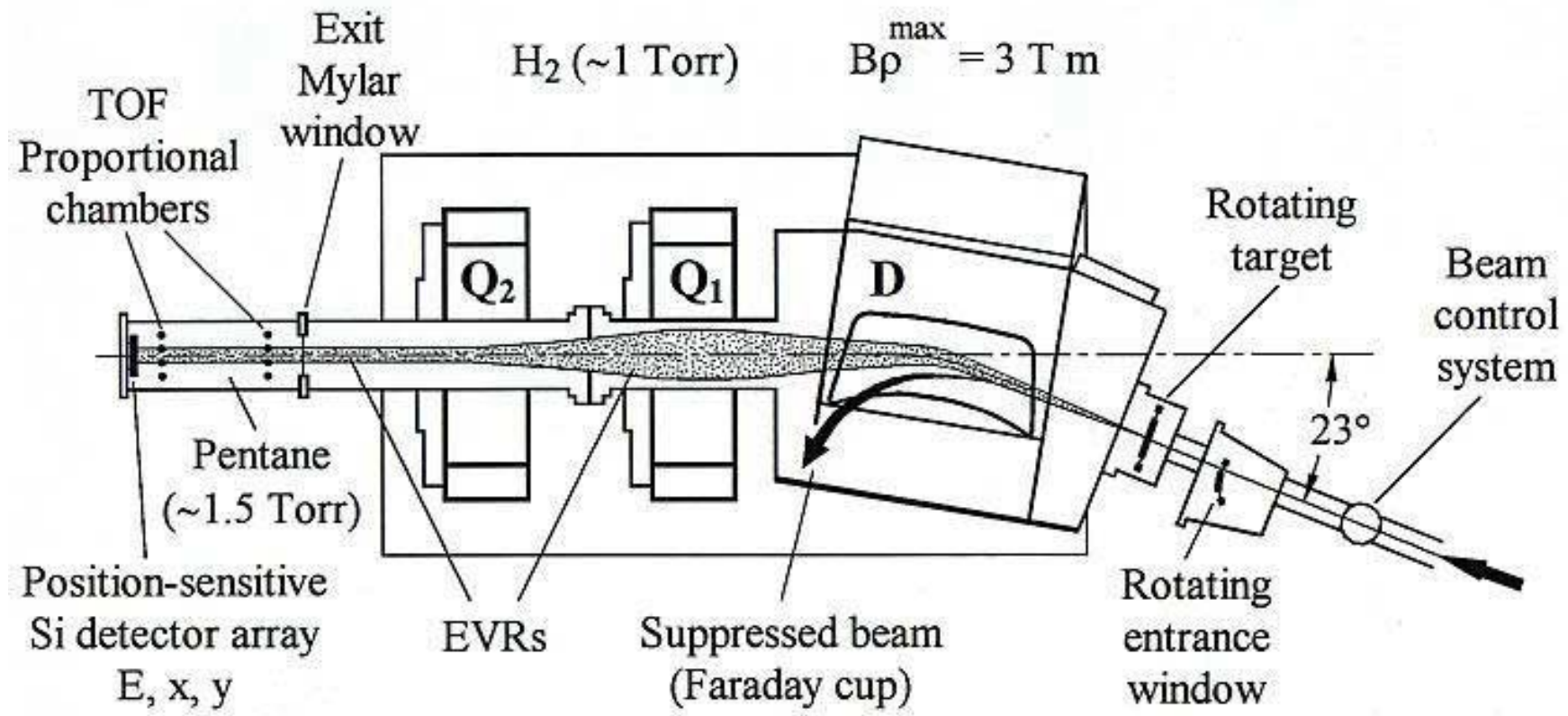


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Workshop on Recoil Separators for Superheavy Element Chemistry
Gesellschaft für Schwerionenforschung
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DETECTION SYSTEM
OF THE DUBNA GAS FILLED RECOIL SEPARATOR

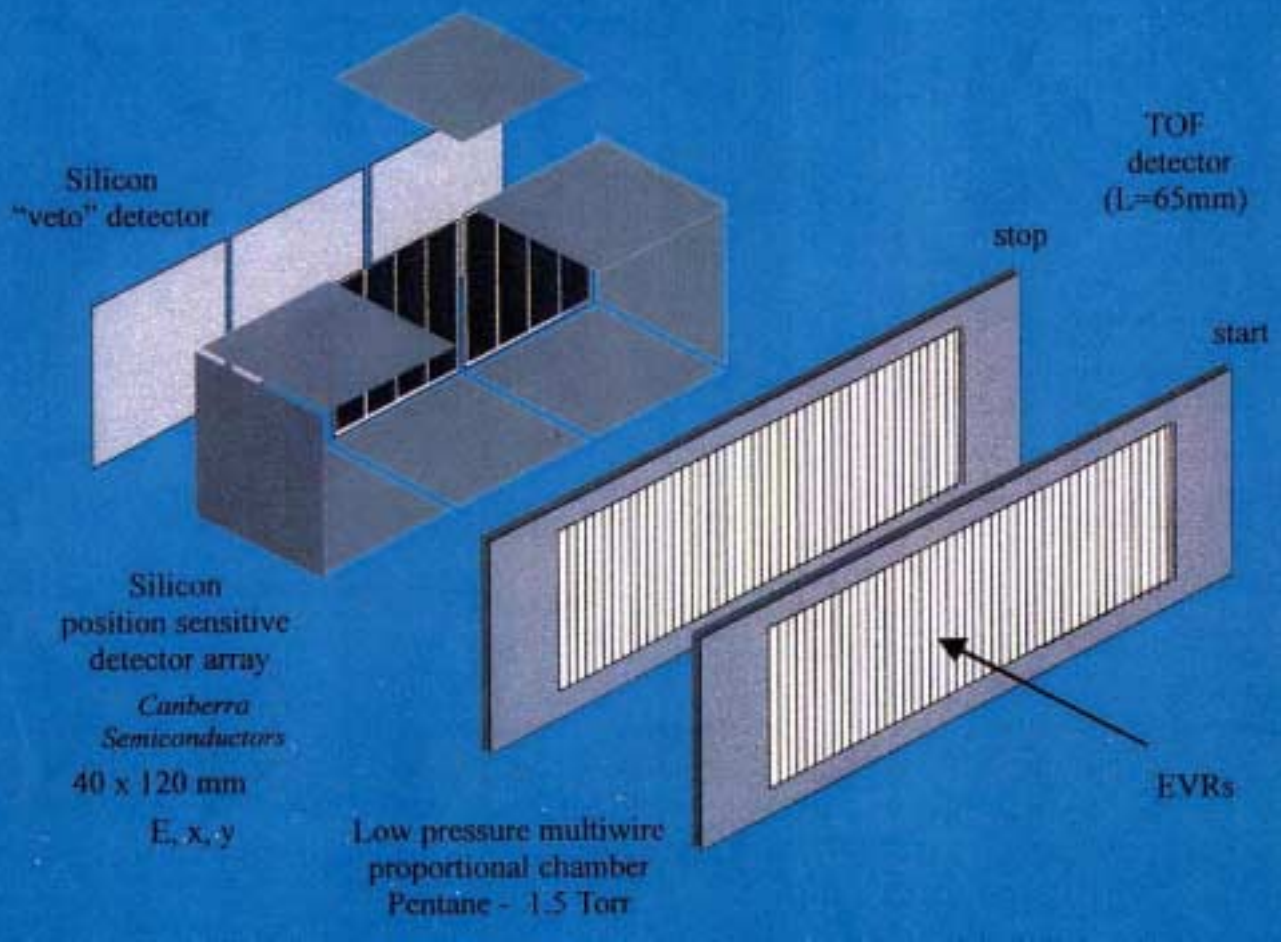
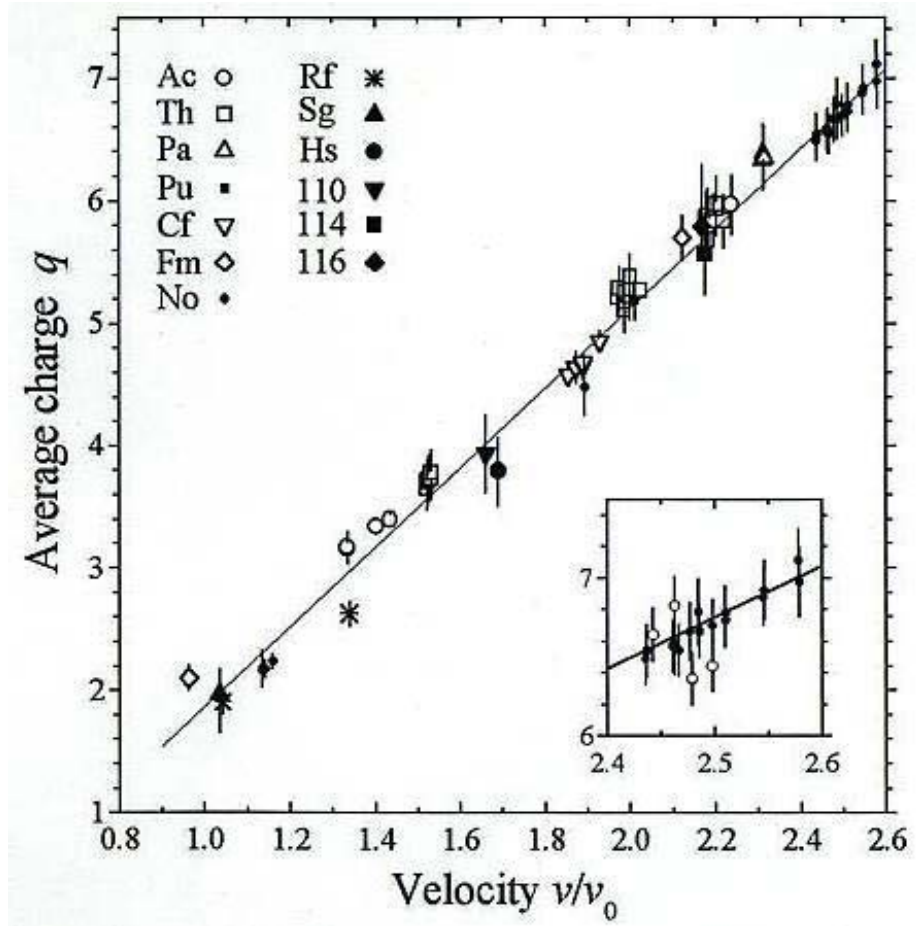
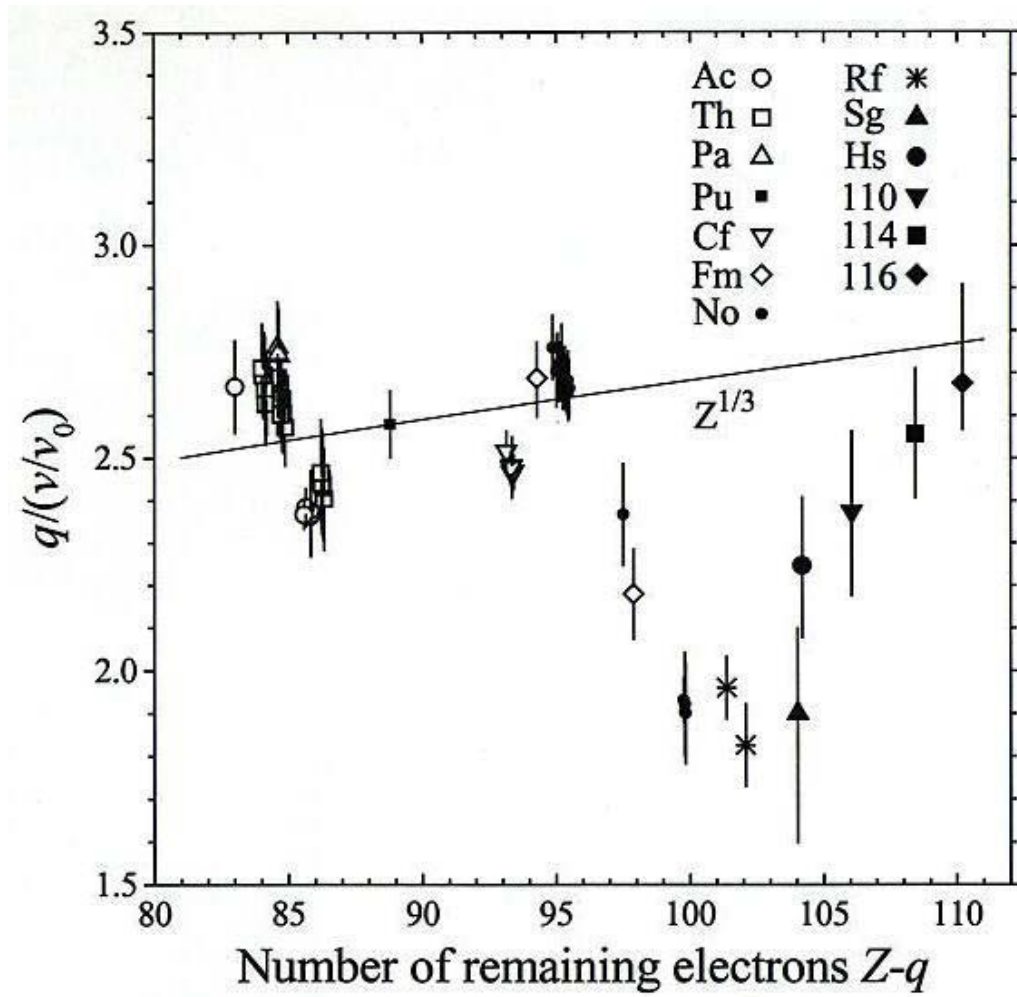


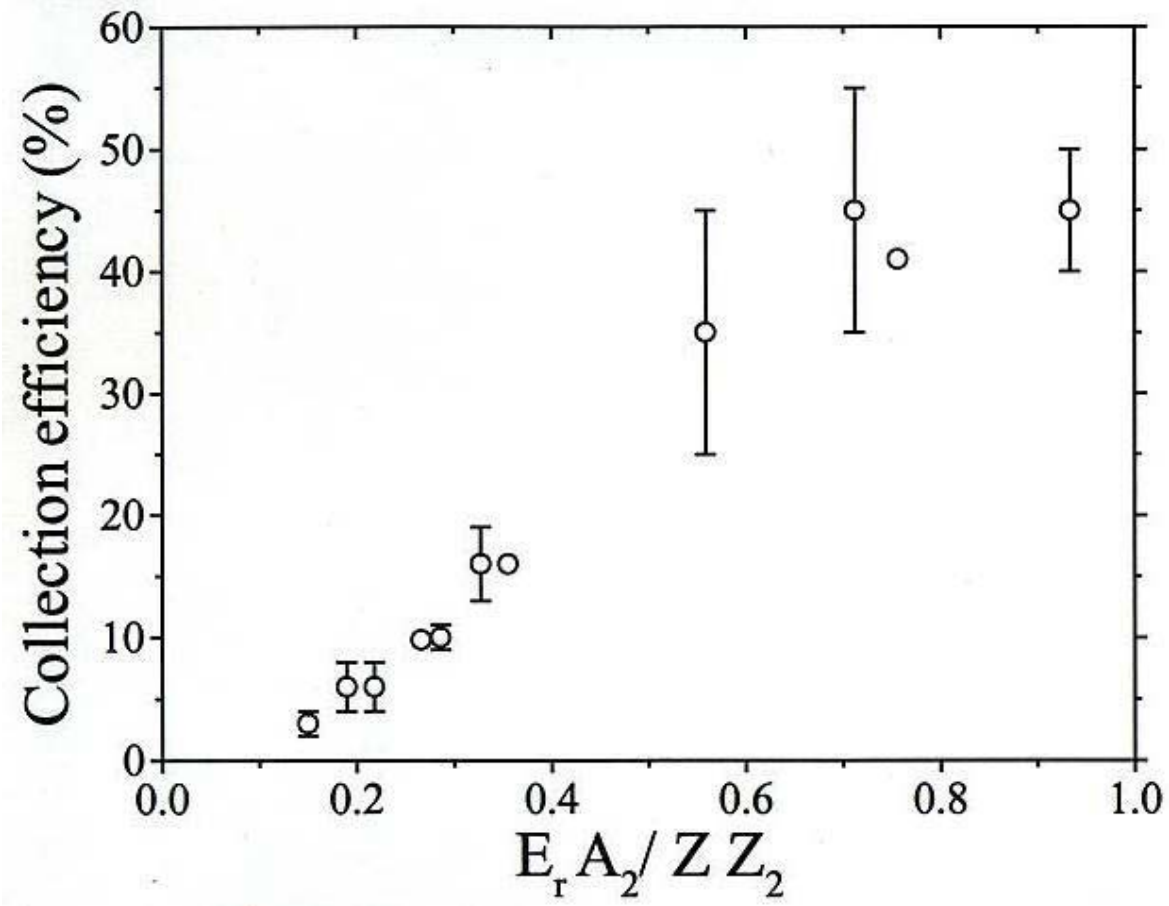
Table 1. Technical parameters of the DGFRS.

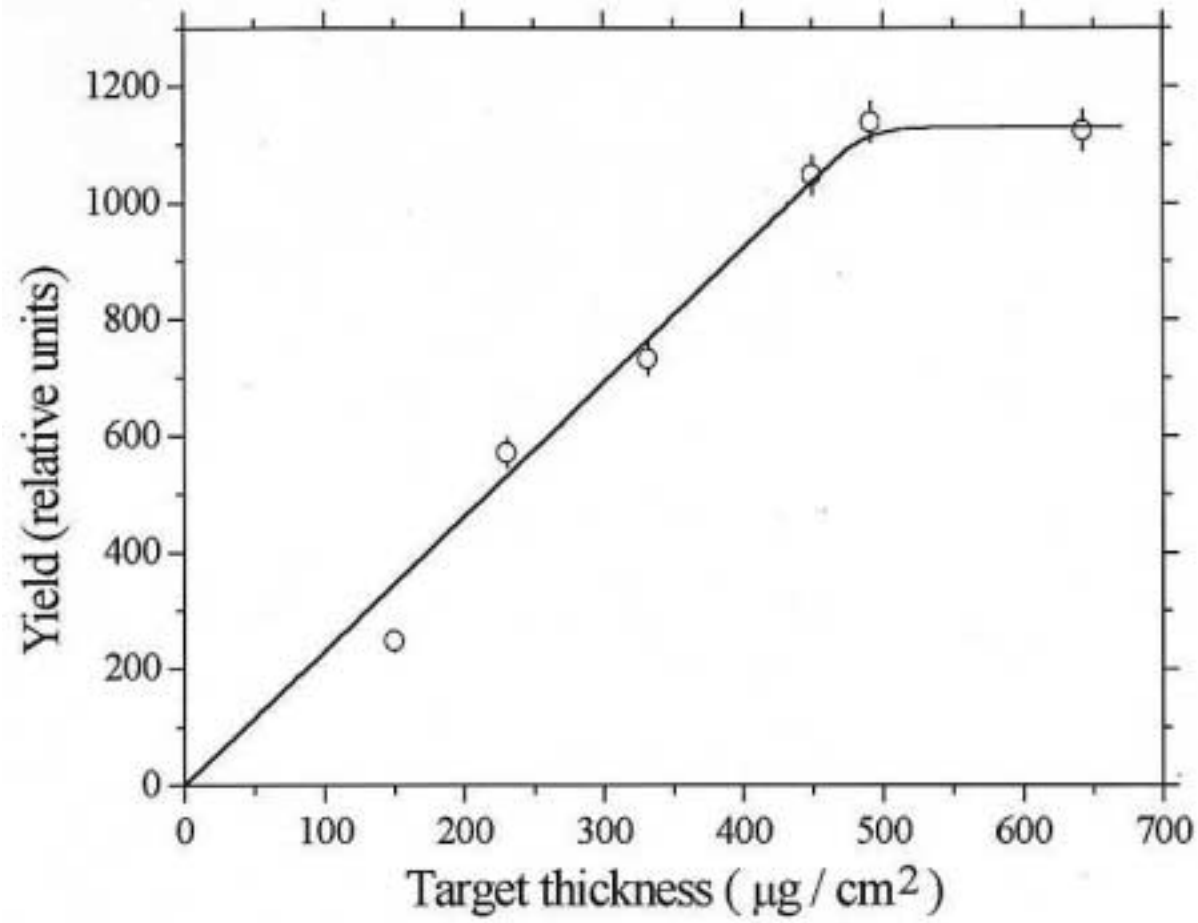
Dipole	
Bending radius ρ	1.8 m
Maximum magnetic flux density B	1.7 T
Bending angle	23°
Inclination of pole edges	26°
Gap	60 mm
Dispersion	7.5 mm per 1% of $B\rho$
Horizontal acceptance	$\pm 3^\circ$
Vertical acceptance	$\pm 2^\circ$
Quadrupoles	
Yoke length	31 cm
Aperture radius	10 cm
Maximum field gradient	13 T/m
Distances ^{*)}	
Target-Dipole	74 cm
Dipole-First quadrupole	88 cm
Quadrupole-Quadrupole	100 cm
Quadrupole-TOF system	122 cm
TOF system-PSD array	18 cm
Diameter of target spot	9 mm
Others	
Pressure of hydrogen	0.7-1 Torr
Pressure of pentane	1.2-1.7 Torr
Typical target thickness	0.2-0.5 mg/cm ²
Mylar window thickness	0.5-1.0 μm

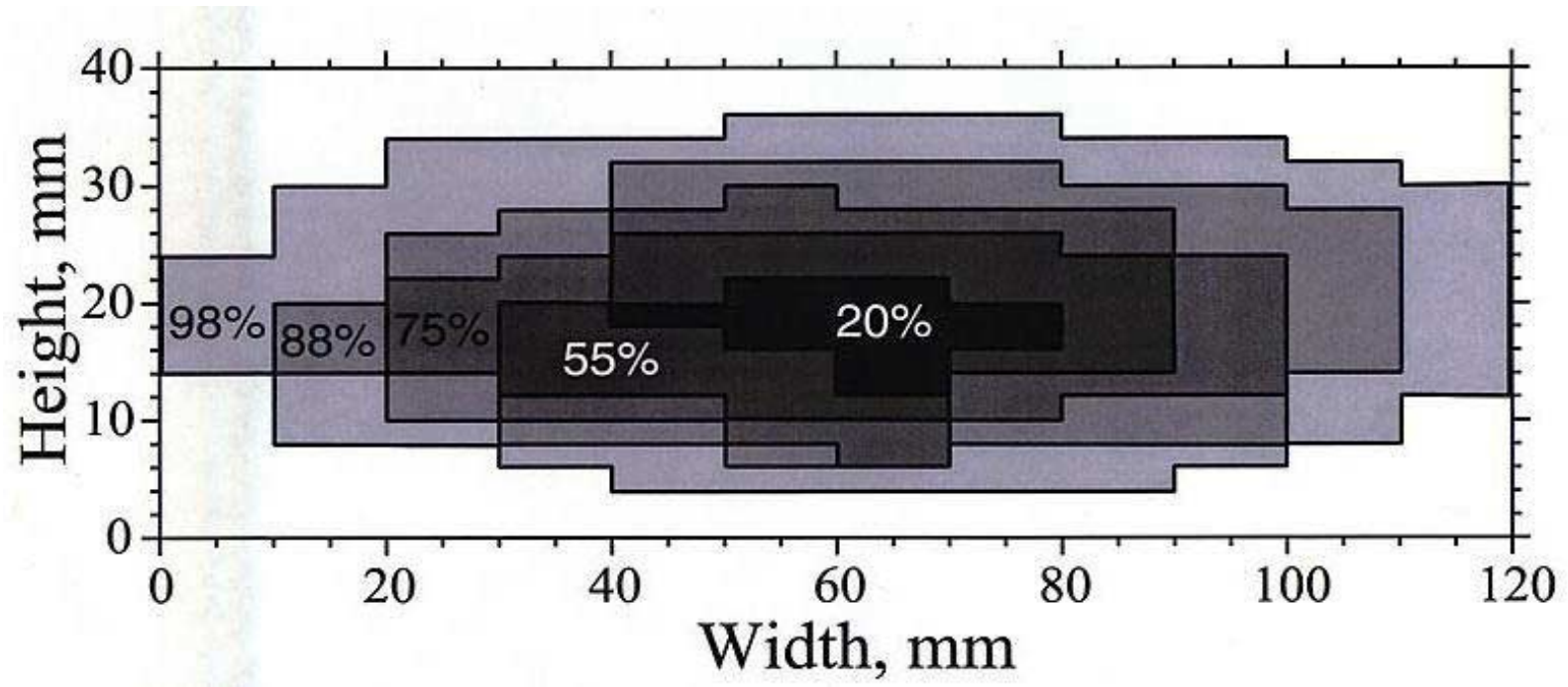
^{*)} The distances correspond to the middles of the dipole, quadrupoles and TOF system.











Summary of characteristics of the Dubna Gas-filled Recoil Separator

Target	²³⁵ U	²³⁸ U	²⁴⁴ Pu	²³⁸ U	²⁰⁷ Pb	²⁴⁴ Pu	²⁰⁷ Pb	²⁰⁶ Pb	²⁴⁸ Cm
Projectile	¹⁸ O	²² Ne	²² Ne	²⁶ Mg	³⁴ S	³⁴ S	⁴⁰ Ar	⁴⁸ Ca	⁴⁸ Ca
Z of EVRs	100	102	104	104	98	110	100	102	116
Beam energy, MeV	93	117	114	140	169	190	191	217	241
E_{EVR} , MeV	5.7	8.3	7.0	11.5	20.9	18.7	27.2	37.9	34.0
$\langle q \rangle$	2.1	2.2	1.9	2.6	4.7	3.9	5.7	6.6	5.8
ϵ_c , %	3±1	5.4±1.4	5*	10*	35	30*	45±10	45	35*
Suppression of -full-energy projectiles	$>5 \times 10^{16}$	$>10^{18}$	5×10^{18}	2×10^{18}	$>3 \times 10^{15}$	5×10^{17}		6×10^{12}	2×10^{16}
-scattered projectiles $E > 40$ MeV		$>10^{18}$	8×10^{17}	3×10^{17}	10^{14}	6×10^{16}	5×10^{12}	6×10^{12}	5×10^{15}
-target-like products							5×10^4		3×10^5
Image FWHM									
-horizontal, cm	8.7	8.7		7.8	7.1		8.3	5.8	
-vertical, cm	3.5	2.1	2.3	2.0	1.6		2.2	1.5	