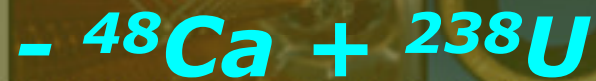


SHE Production in Hot Fusion at SHIP



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283112 History - $^{238}\text{U}(48\text{Ca}, 3n/4n)^{283,282}\text{112}$

1. direct population as evaporation residue

	separator	E^*/MeV	#events	decay	σ/pb	$T_{1/2}$	ER
1999	Vassillissa ¹	33	2	SF	5.6	81s	$^{283}\text{112}$ (3n)
		39	-				
2003	Vassillissa ²	33	-		~4	5.1min	$^{283}\text{112}$ (3n)
		35.5	2	SF			
2004	DGFRS ³	31.4	1	missing α -SF	0.6		$^{283}\text{112}$ (3n)
		35.0	2	missing α -SF			
			3	α -SF			
			1	α - α - α - α -SF			
			39.8	1			

2. in decay of $^{287}\text{114}$ at Vassillissa as SF at DGFRS as α -decay

3. BGS/LBNL Berkeley⁴: no decay for $^{283}\text{112}$ with $\rightarrow \sigma_{\text{limit}} \approx 1 \text{ pb}$

4. FLNR chemistry⁵: 7 sf events with $T_{1/2} \approx 60\text{s}$ $\rightarrow \sigma \approx 2 \text{ pb}$

¹Yu.Ts. Oganessian, A.V. Yeremin, et al., Eur. Phys. J. A 5, 63 (1999)

²Yu.Ts. Oganessian, A.V. Yeremin, et al., Eur. Phys. J. A 19, 3 (2004)

³Yu.Ts. Oganessian, V.K. Utyonkov, et al., Phys. Rev. C 70, 64609 (2004)

⁴W. Loveland, et al., Phys. Rev. C 66, 44617 (2002);

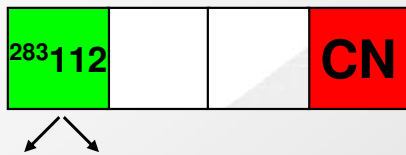
K.E. Gregorich et al., private communication

⁵A.B. Yakushev, et al., Radiochim. Acta 91, 433 (2003)

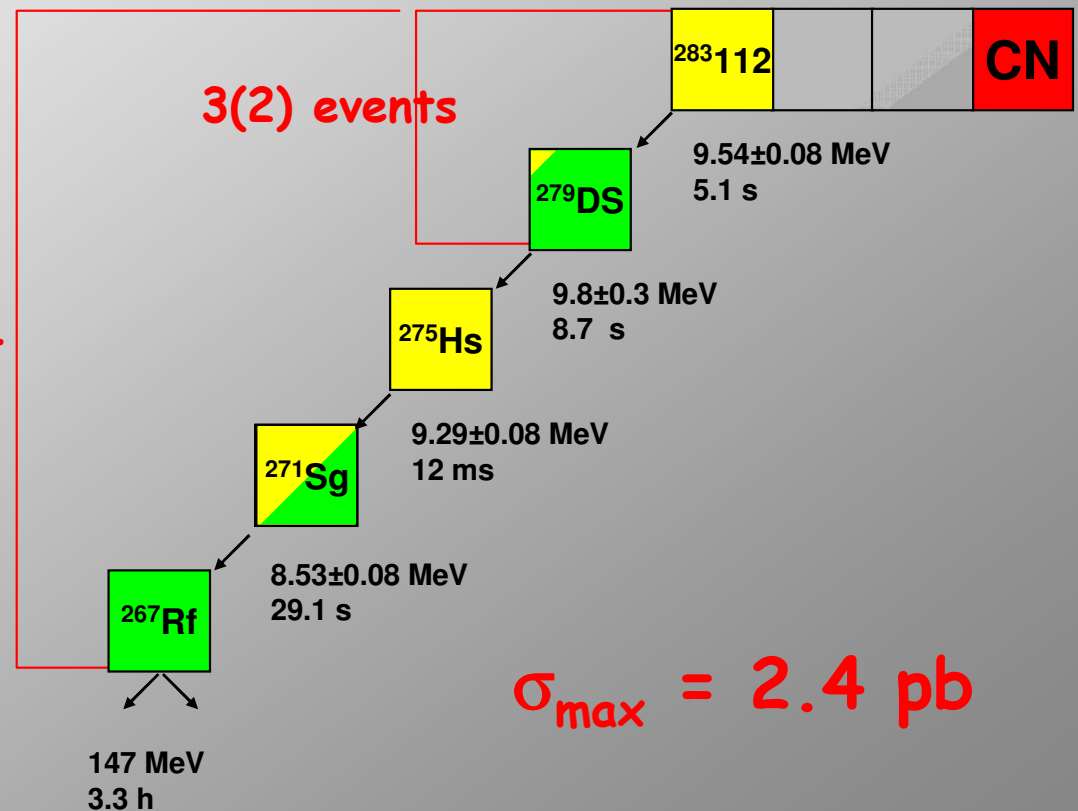
Decay Patterns for $^{283}_{112}$ from Dubna

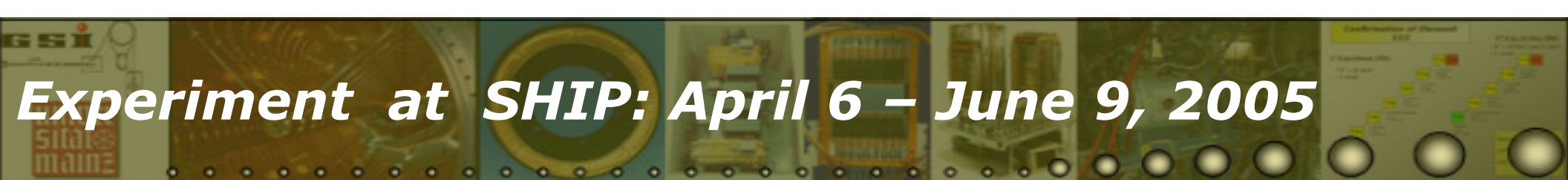
Vassillissa

DGFRS

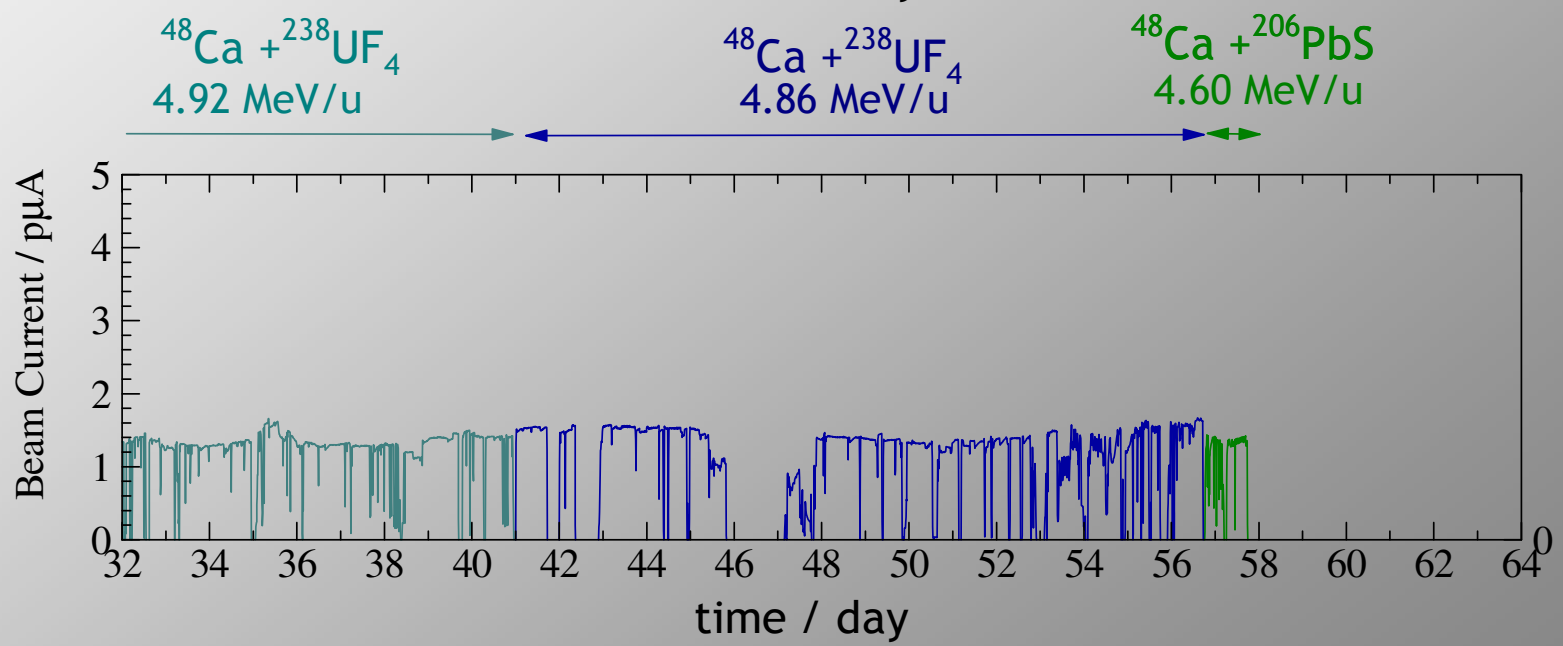
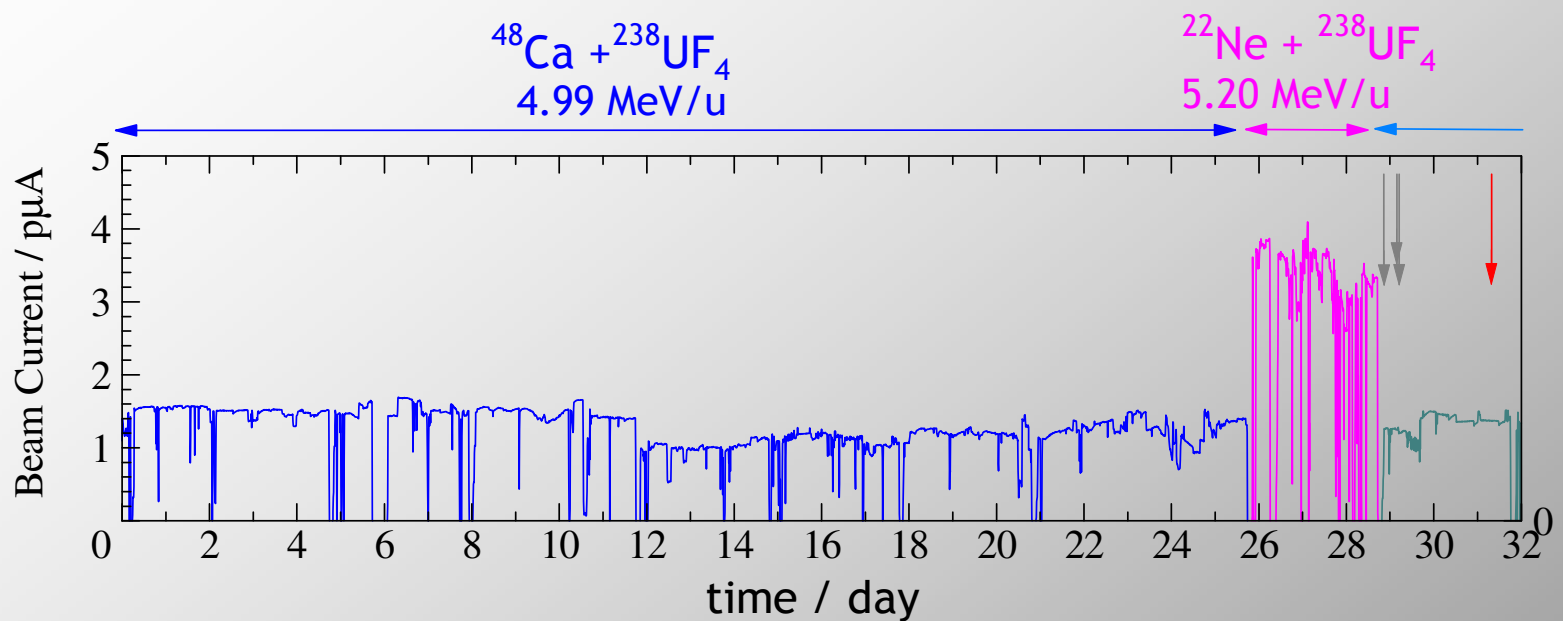


4 events
81 s - 5 min
4-5.6 pb

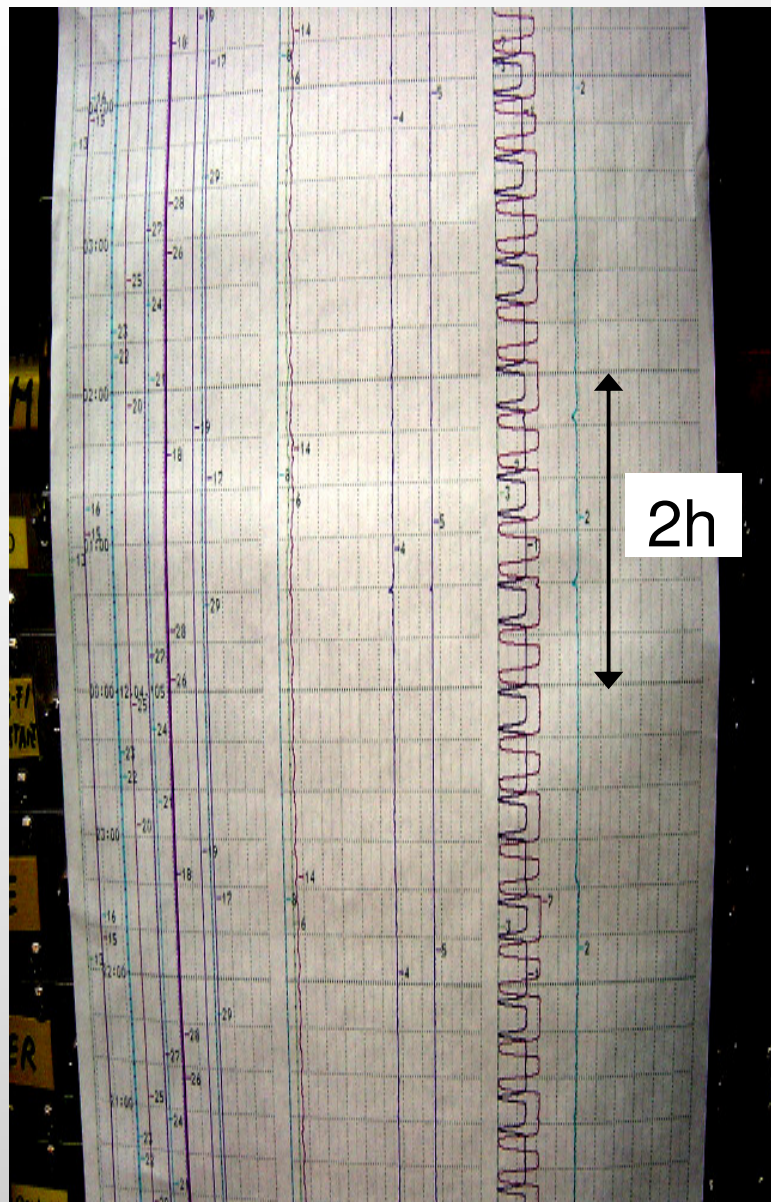




Experiment at SHIP: April 6 – June 9, 2005



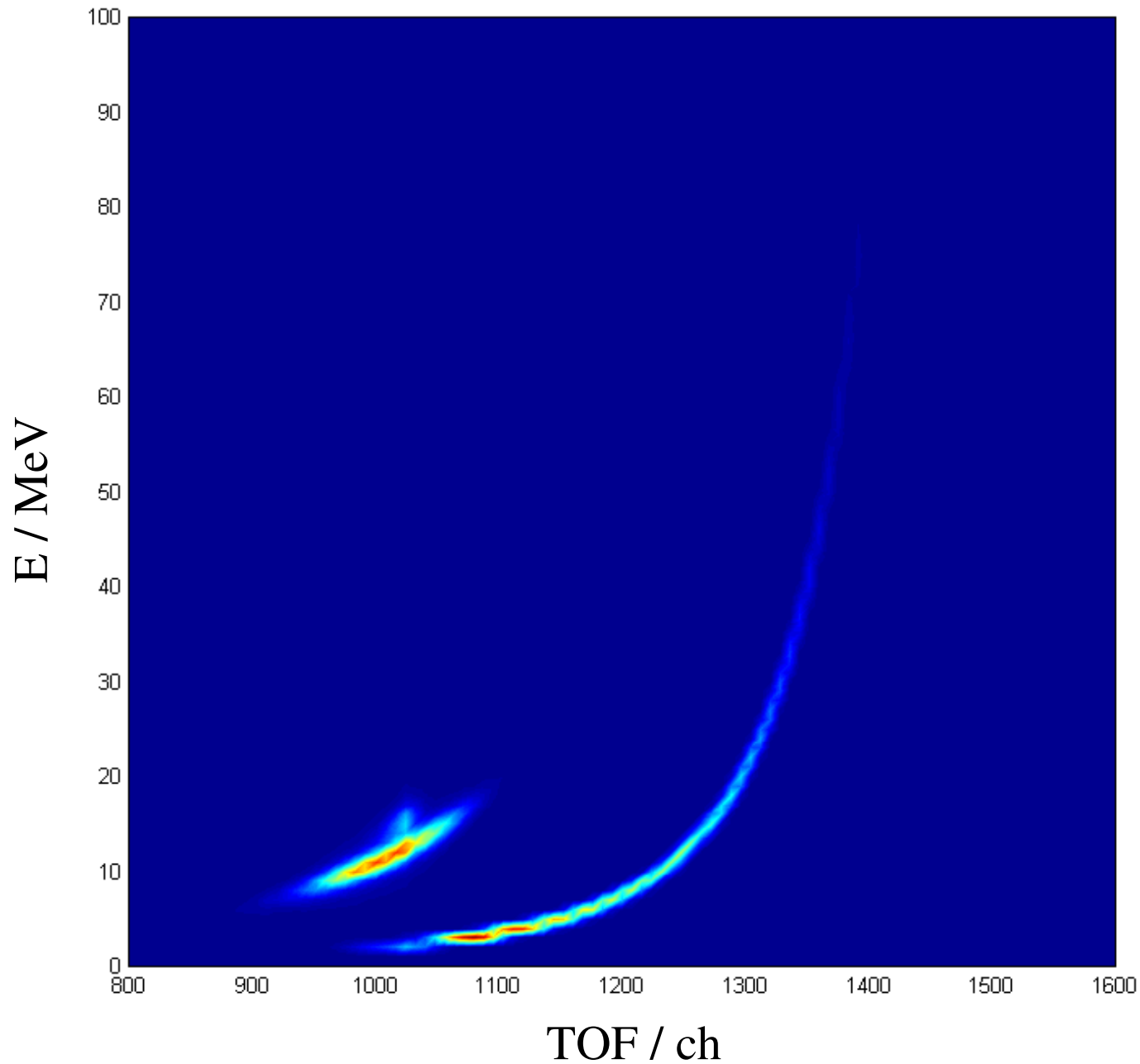
Stable conditions



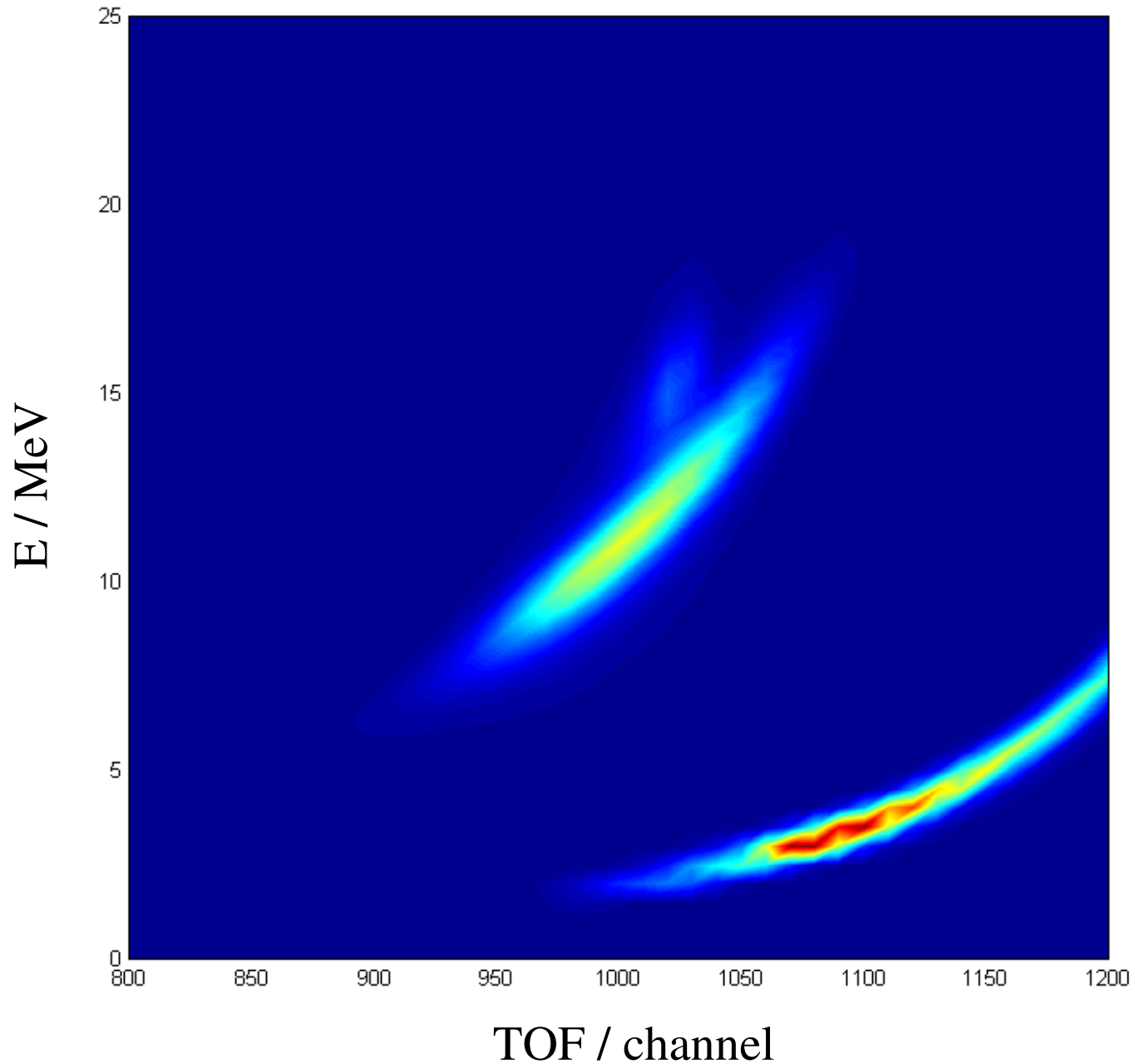
Rotating $^{238}\text{UF}_4$ target wheel
14 Wheels \Rightarrow 4.3 days / wheel

Stable 1.2 μA beam of $^{48}\text{Ca}^{10+}$

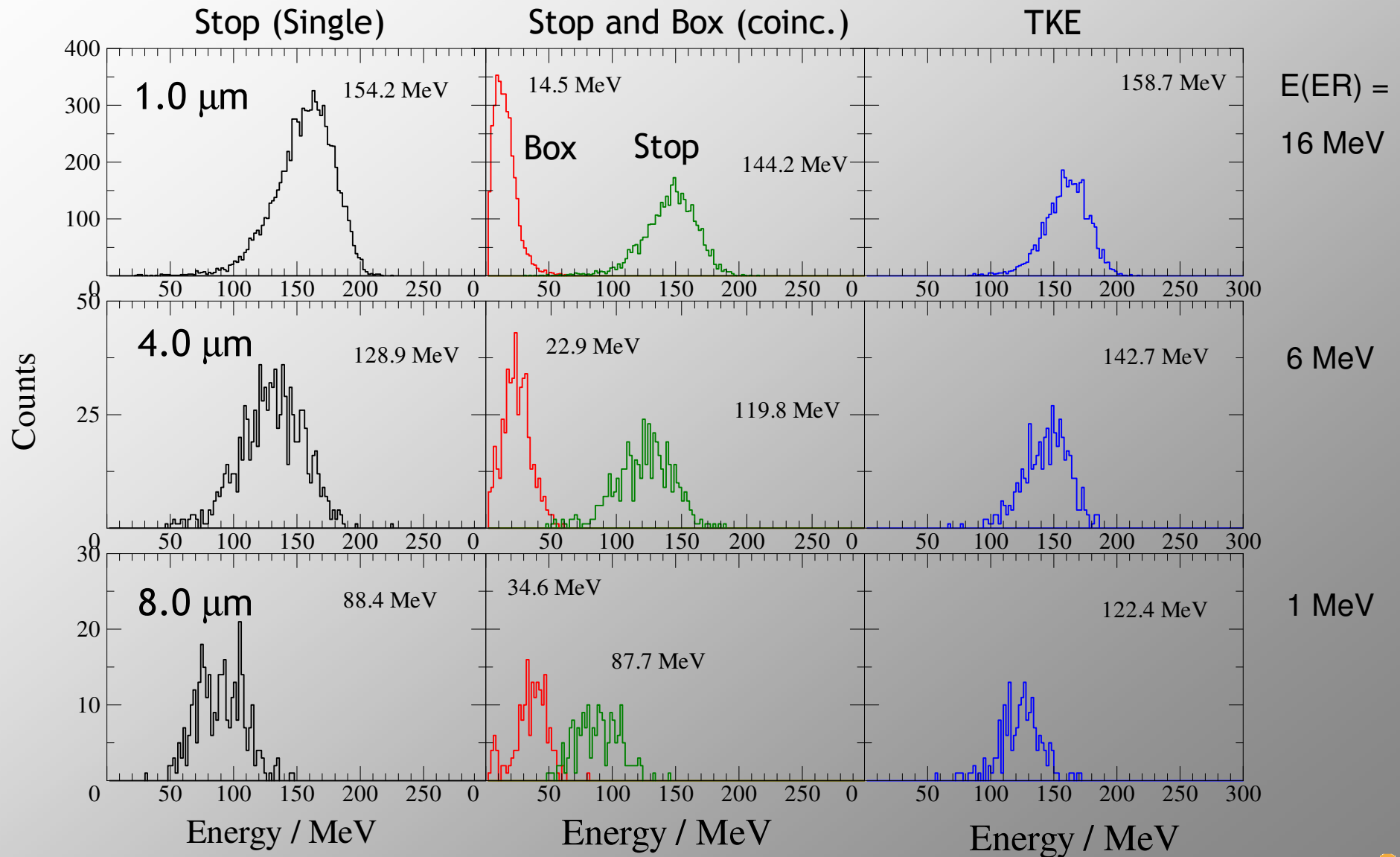
$^{48}\text{Ca} + ^{206}\text{PbS}$, $1\ \mu\text{m}$ degr. foil, α calibration



$^{48}\text{Ca} + ^{206}\text{PbS}$, $1\ \mu\text{m}$ degr. foil, α calibration

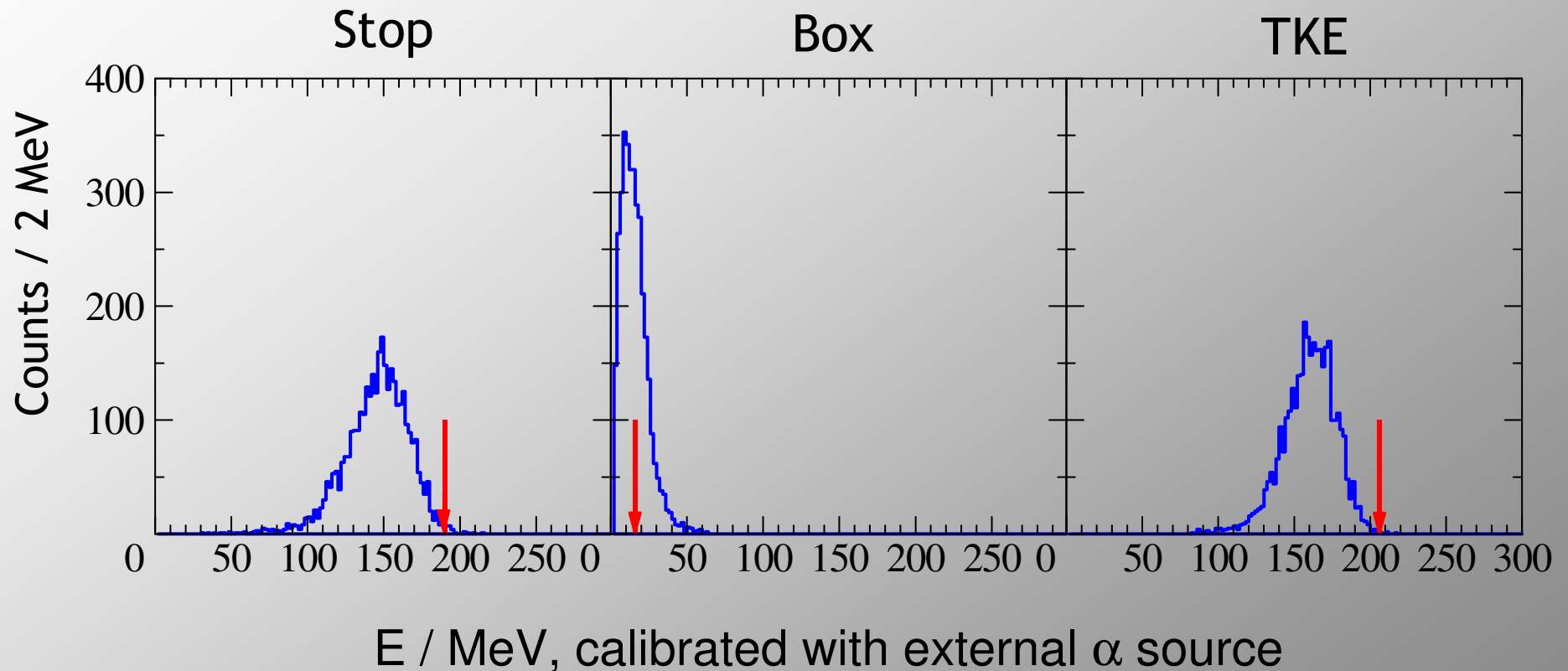


sf from $^{48}\text{Ca} + ^{206}\text{PbS}$, E_{sf} (impl. depth, α calibration)



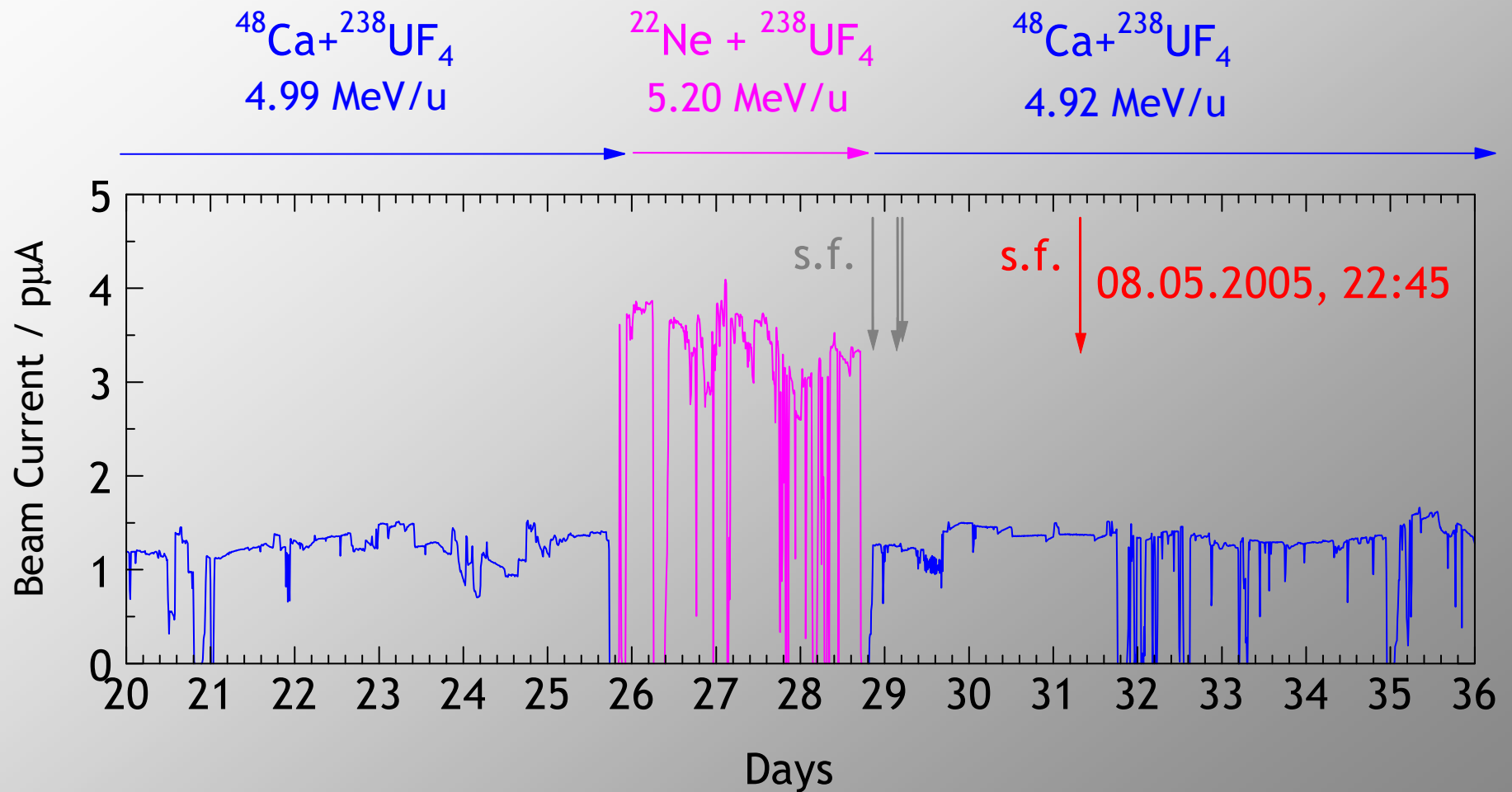
sf from $^{48}\text{Ca} + ^{206}\text{PbS}$ and $^{48}\text{Ca} + ^{238}\text{UF}_4$

sf detected 08.05.2005, 22:45 h; TKE = $206 + 34 = 240 \pm 18$ MeV

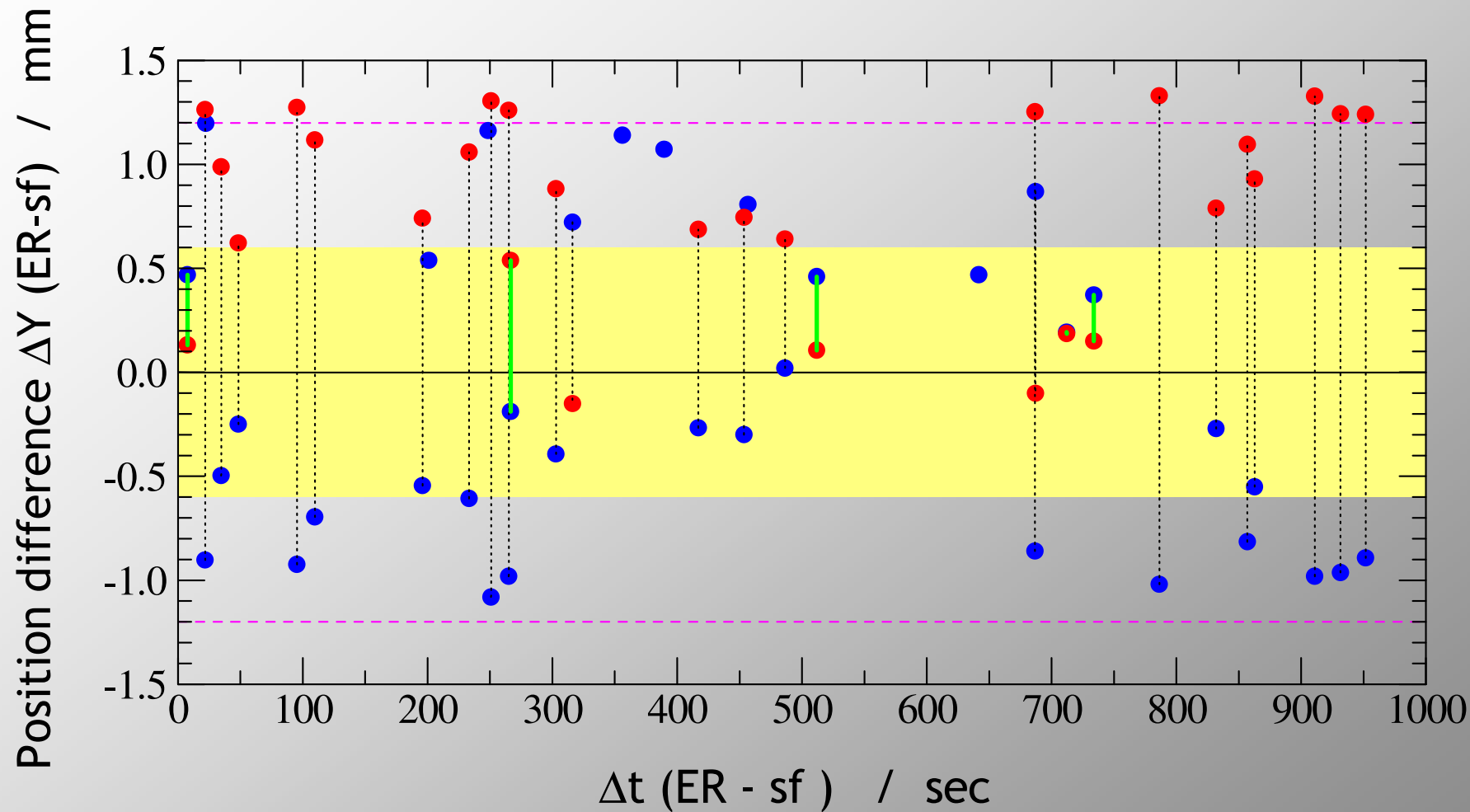


fission calibration: + 34 MeV from TKE (^{252}No) = 195 MeV

Observed spontaneous fission events



Search for implanted ER's

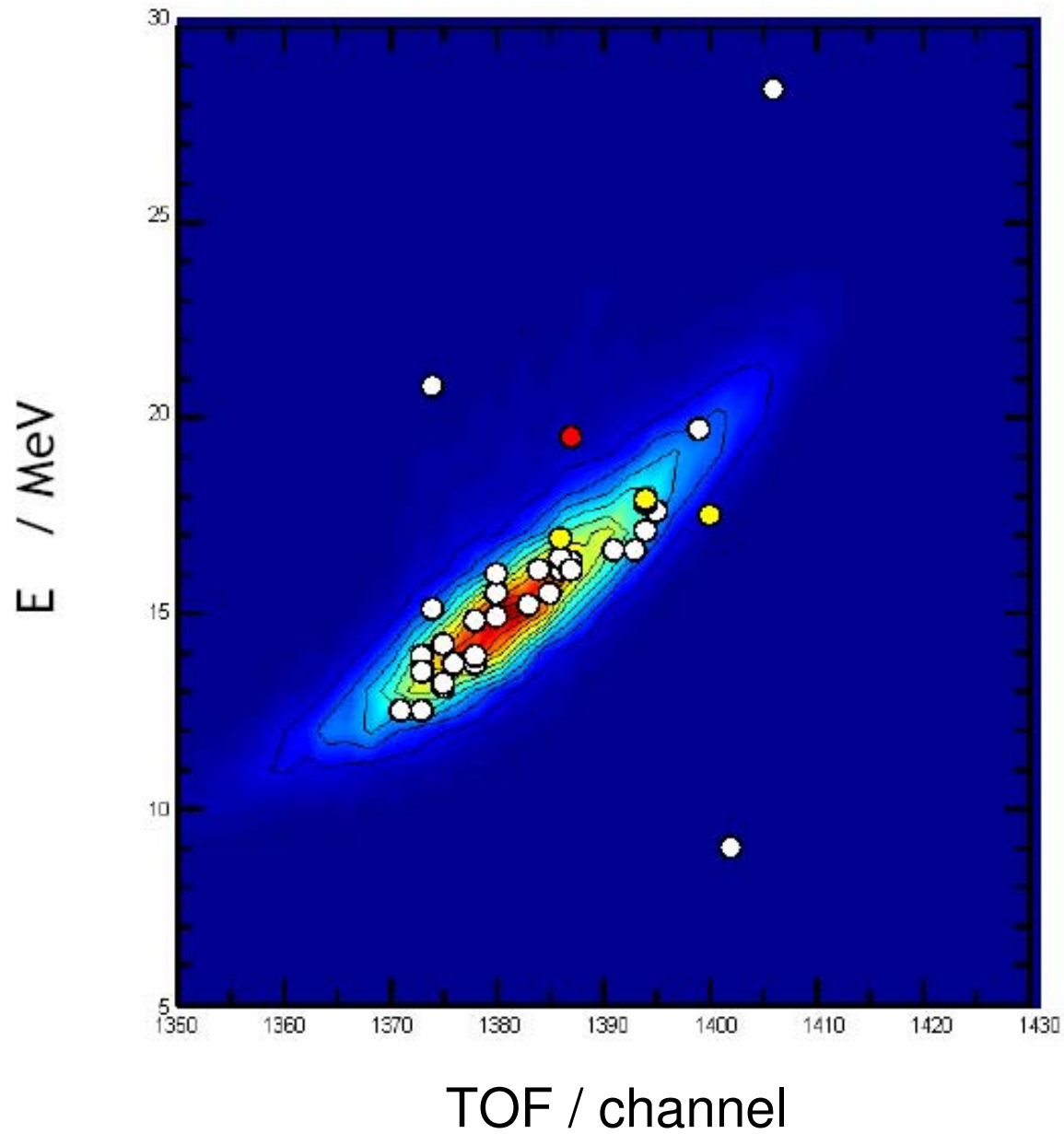


Plotted at least One position is $\Delta < 1.2$ mm

- Position Read from TOP
- Position Read from BOTTOM

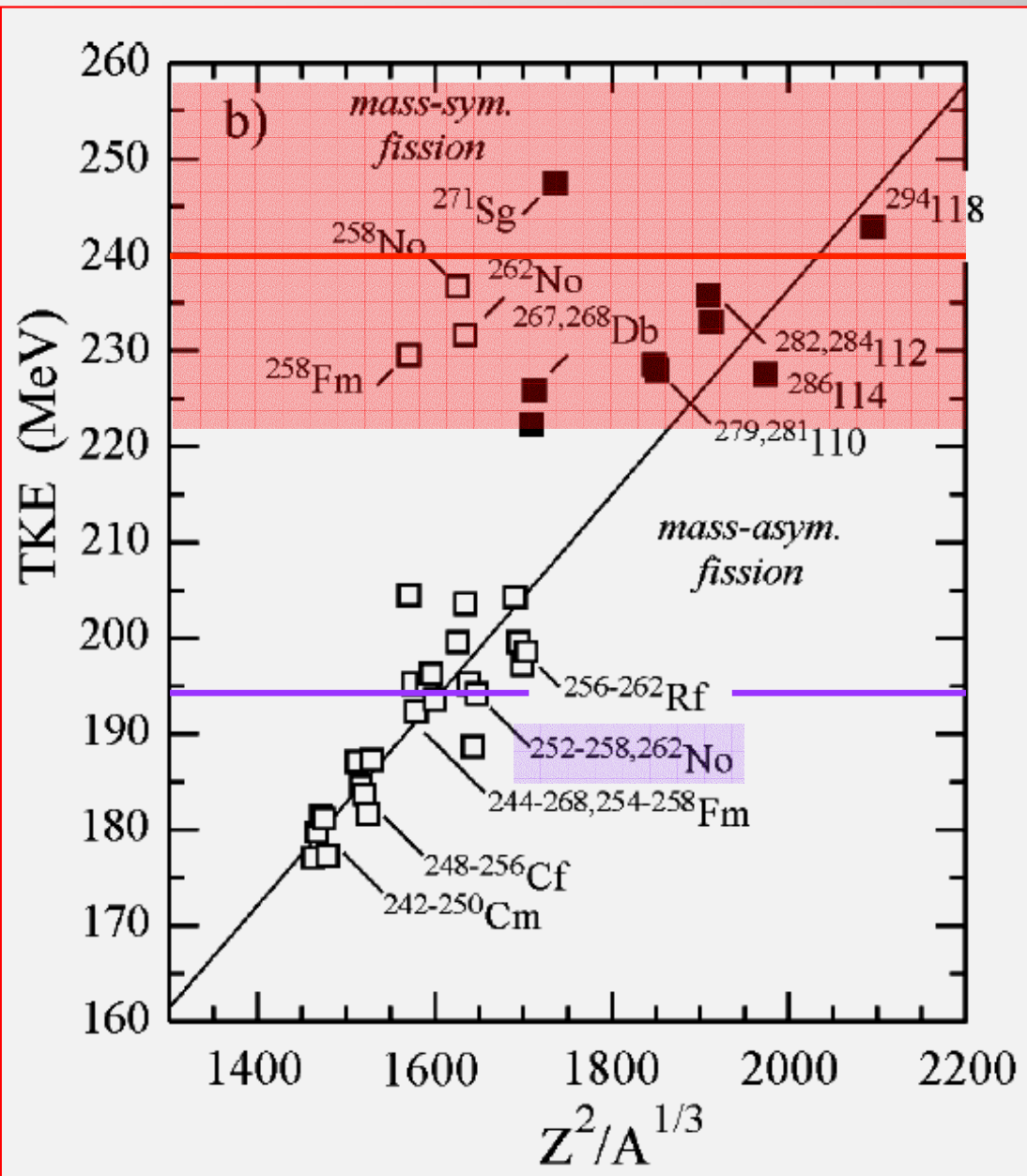
— TOP and BOTTOM Position agree within ± 0.6 mm

Energy versus time-of-flight plot



Viola-Seaborg systematic

TKE of sf event from
 $^{48}\text{Ca} + ^{238}\text{U}$
measured at SHIP
is 240 ± 18 MeV



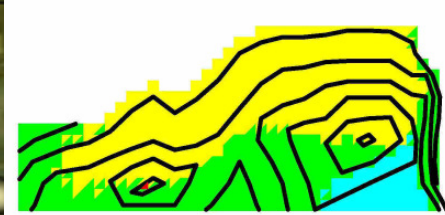
Yu. Ts. Oganessian et al.,
Phys. Rev. C70, 64609 (2004)

$^{48}\text{Ca} + ^{238}\text{U} \rightarrow ^{286-x}112 + xn$ at DGFRS and SHIP

E^*/MeV	dose/ 10^{19}	events	$T_{1/2}$ (parent)	x	σ/pb (1 ev. limits)
31.4	0.58	1 (ER- $[\alpha]$ -sf)*	(3.4 s)	3	0.5 +1.2 -0.4
32.0	0.7	0	--		< 0.8
35.0	0.71	$\left\{ \begin{array}{l} 2 \text{ (ER-}[\alpha]\text{-sf)} \\ 3 \text{ (ER- } \alpha \text{-sf)} \\ 1 \text{ (ER-4}\alpha\text{-sf)} \end{array} \right.$	$\left\{ \begin{array}{l} (1.4 \text{ s}) \\ 2.7 \text{ s} \\ 6.1 \text{ s} \end{array} \right.$	3	2.5 +1.8 -1.1
34.5	1.0	1 (ER-sf)	5.2 s	?	0.7 +1.6 -0.6
39.8	0.52	1 (ER-sf)	0.14 ms	4	0.6 +1.6 -0.5
37.0	1.2	0	--	--	< 0.6

* Dubna work: $T_{1/2}(^{279}\text{Ds}) = 0.18 \text{ s}$, $b_{\text{sf}} = 0.9$

SHIP Collaboration



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