

## LISE++ version 10.0.41

<https://groups.nslc.msu.edu/frib/rates/2017/>

Name	Last modified	Size	Description
<a href="#">Parent Directory</a>	-	-	-
<a href="#">FRIBrates v1 08.xlsm</a>	2017-07-17 18:34	4.6M	
<a href="#">FRIBrates v1 08 LIST.xlsx</a>	2017-07-17 18:28	406K	
<a href="#">FRIBrates v1 08a.xlsm</a>	2017-07-17 18:34	4.6M	
<a href="#">FRIBrates v1 08a LIST.xlsx</a>	2017-07-17 18:29	402K	
<a href="#">FRIBrates v1 08b.xlsm</a>	2017-07-17 18:35	4.6M	
<a href="#">FRIBrates v1 08b LIST.xlsx</a>	2017-07-17 18:29	401K	

Utilities	1D-Plot	2D-Plot	Databases	Help
LISE++ for Excel				
CODES : Charge, Global, PACE4, etc.				
Radioactivity, decays				
Reactions utilities				
Plots : Energy loss, Ranges, Stragglings, etc.				
<b>FRIB / NSCL / ISOL rates</b>				
NSCL / Europe / RIKEN primary beam lists				
Set-up utilities				
Range optimizer (Gas cell utility)				
Gas pressure optimization for gas-filled dipole				
CATCHER utility (ISOL, Fusion-Residual)				
Rate & transmission calculation: batch mode				
Stripper foil lifetime				

plot: FRIB rates	v.1.08 using EPAX 2.15 : 400 kW
plot: FRIB beams	v.1.08 using EPAX 2.15 : 1st year
link: FRIB (v.1.06)	v.1.08 using EPAX 2.15 : 2nd year
Location of "FRIB" isotopes	
plot: NSCL PAC35 rates	v.1.07 using EPAX 3.01 : 400 kW
plot: NSCL PAC35 beams	
link: NSCL PAC35 rates	
plot: ISOL rates	
link: ISOL rates features	

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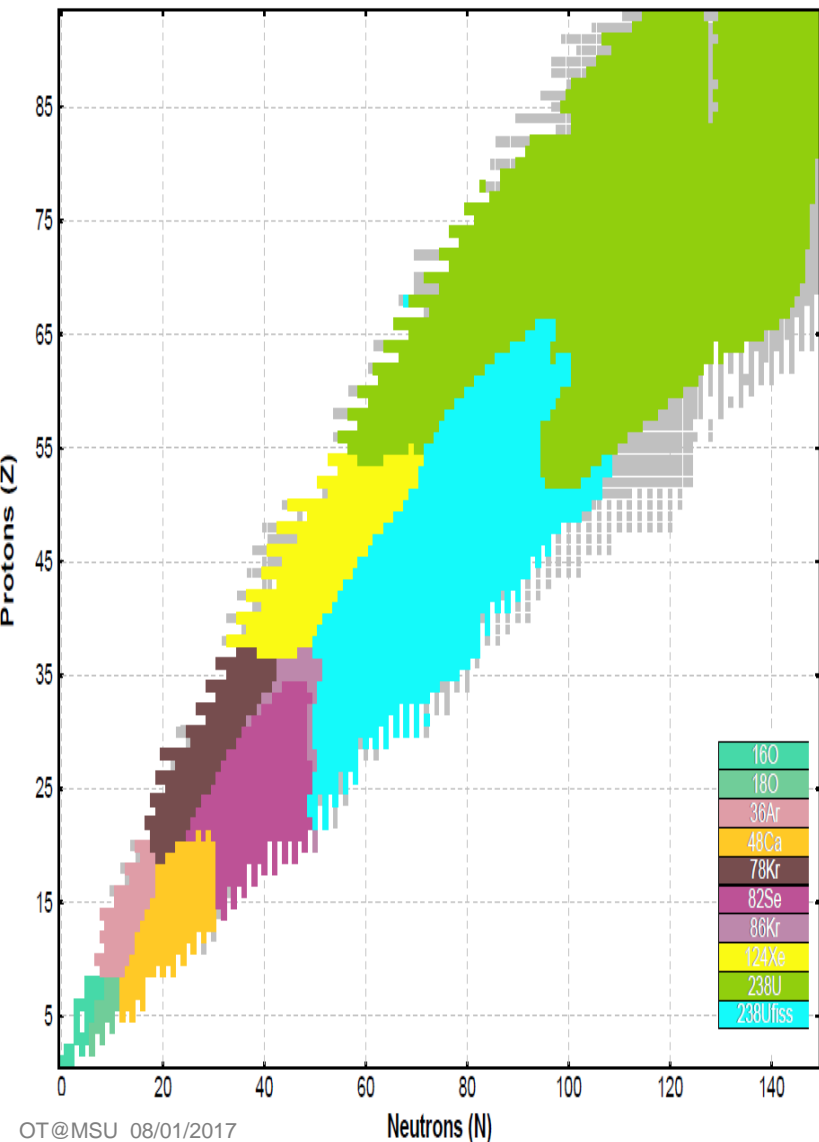
plot: FRIB rates	
<b>plot: FRIB beams</b>	v.1.08 using EPAX 2.15 : 400 kW
link: FRIB (v.1.06)	v.1.08 using EPAX 2.15 : 1st year
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plot: NSCL PAC35 beams	
link: NSCL PAC35 rates	
plot: ISOL rates	

# FRIB primary beam lists

Beam				Beam intensity (relative)			Beam intensity (pps)			Beam intensity (pnA)		
Beam	A	Z	MeV/u	Year 1 (10 kW)	Year 2 (50 kW)	400 kW	Year 1	Year 2	400 kW	Year 1	Year 2	400 kW
238U	238	92	203	1/40	1/8	1	1.3E+12	6.5E+12	5.2E+13	2.1E+2	1.0E+3	8.3E+3
209Bi	209	83	210			1			5.7E+13			9.1E+3
208Pb	208	82	210			1			5.7E+13			9.2E+3
204Pb	204	82	214			1			5.7E+13			9.2E+3
204Hg	204	80	208			1			5.9E+13			9.4E+3
198Pt	198	78	210			1			6.0E+13			9.6E+3
196Hg	196	80	218			1			5.9E+13			9.4E+3
190Pt	190	78	218			1			6.0E+13			9.7E+3
186W	186	74	214			1			6.3E+13			1.0E+4
184Os	184	76	220			1			6.2E+13			9.9E+3
180W	180	74	220			1			6.3E+13			1.0E+4
176Yb	176	70	216			1			6.6E+13			1.1E+4
174Hf	174	72	221			1			6.5E+13			1.0E+4
170Er	170	68	218			1			6.7E+13			1.1E+4
168Yb	168	70	225			1			6.6E+13			1.1E+4
162Er	162	68	227			1			6.8E+13			1.1E+4
160Gd	160	64	219			1			7.1E+13			1.1E+4
156Dy	156	66	228			1			7.0E+13			1.1E+4
150Nd	150	60	219			1			7.6E+13			1.2E+4
144Sm	144	62	233			1			7.5E+13			1.2E+4
136Xe	136	54	222			1			8.3E+13			1.3E+4
130Te	130	52	217			1			8.9E+13			1.4E+4
124Xe	124	54	235	1/40	1/8	1	2.1E+12	1.1E+13	8.6E+13	3.4E+2	1.7E+3	1.4E+4
124Sn	124	50	222			1			9.1E+13			1.5E+4
112Sn	112	50	242			1			9.2E+13			1.5E+4
106Cd	106	48	244			1			9.6E+13			1.5E+4
96Zr	96	40	234			1			1.1E+14			1.8E+4
92Mo	92	42	248		1/8	1		1.4E+13	1.1E+14		2.2E+3	1.8E+4
86Kr	86	36	233	1/40	1/8	1	3.1E+12	1.6E+13	1.2E+14	5.0E+2	2.5E+3	2.0E+4
82Se	82	34	237	1/40	1/8	1	3.2E+12	1.6E+13	1.3E+14	5.2E+2	2.6E+3	2.1E+4
78Kr	78	36	260	1/40	1/8	1	3.1E+12	1.5E+13	1.2E+14	4.9E+2	2.5E+3	2.0E+4
76Ge	76	32	239			1			1.4E+14			2.2E+4
64Zn	64	30	261			1			1.5E+14			2.4E+4
64Ni	64	28	253		1/8	1		1.9E+13	1.5E+14		3.1E+3	2.5E+4
58Ni	58	28	275		1/8	1		2.0E+13	1.6E+14		3.1E+3	2.5E+4
48Ca	48	20	240	1/40	1/8	1	5.4E+12	2.7E+13	2.2E+14	8.7E+2	4.3E+3	3.5E+4
40Ca	40	20	280			1			2.2E+14			3.6E+4
40Ar	40	18	268			1			2.3E+14			3.7E+4
36Ar	36	18	293	1/40	1/8	1	5.9E+12	3.0E+13	2.4E+14	9.5E+2	4.7E+3	3.8E+4
36S	36	16	265			1			2.6E+14			4.2E+4
32S	32	16	293			1			2.7E+14			4.3E+4
30Si	30	14	276			1			3.0E+14			4.8E+4
28Si	28	14	293			1			3.0E+14			4.9E+4
22Ne	22	10	271		1/8	1		5.2E+13	4.2E+14		8.4E+3	6.7E+4
20Ne	20	10	294			1			4.3E+14			6.8E+4
18O	18	8	266	1/40	1/8	1	1.3E+13	6.5E+13	5.2E+14	2.1E+3	1.0E+4	8.3E+4
16O	16	8	294	1/40	1/8	1	1.3E+13	6.6E+13	5.3E+14	2.1E+3	1.1E+4	8.5E+4
			count	9	13	47						

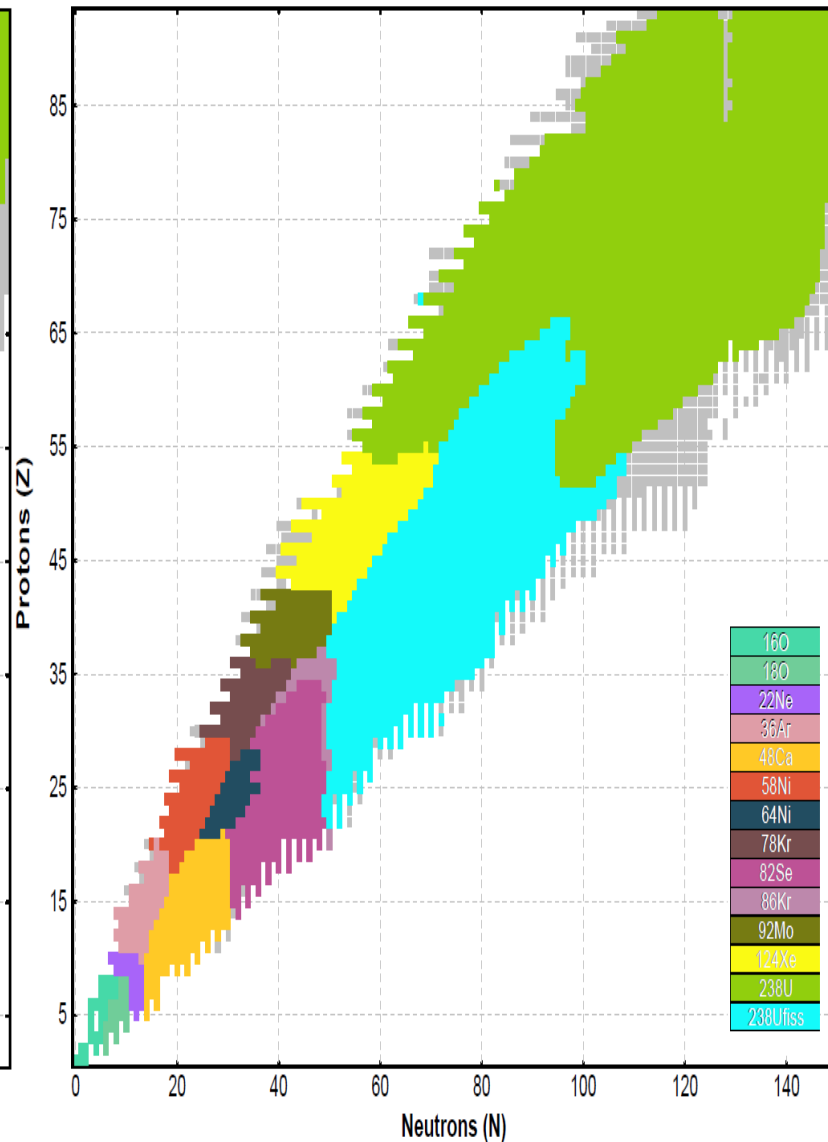
## FRIB fast beam rates (v.1.08a) : 1st year

1st year operation! 9 beams @ I=10kW. 1us flight is taken into account. The rates are estimated based on the EPAX 2.15 cross section parameterization for fragmentation and the LISE++ 3EER model for in-flight fission. Primary beam intensities and energies based on 10 kW and 200 MeV/u for  $^{238}\text{U}$



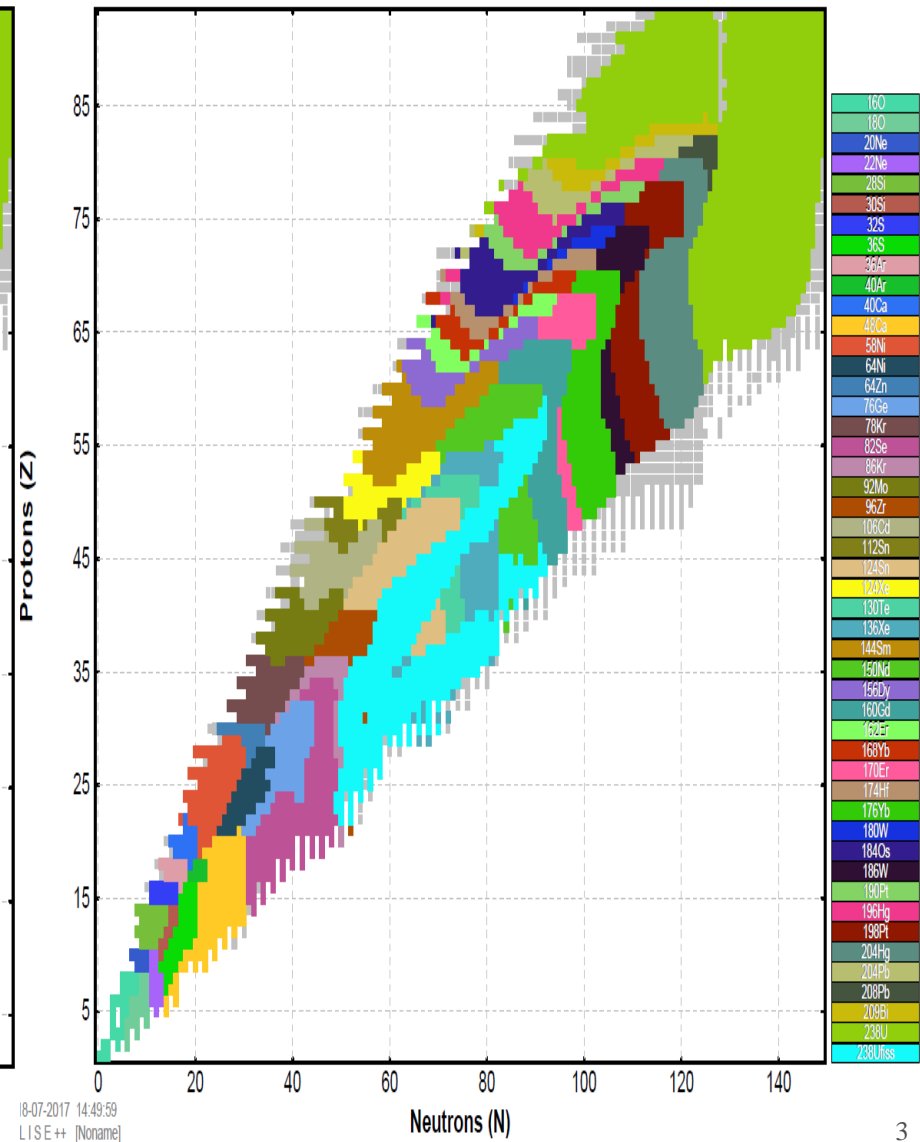
## FRIB fast beam rates (v.1.08b) : 2nd year

2nd year operation! 13 beams @ I=50kW. 1us flight is taken into account. The rates are estimated based on the EPAX 2.15 cross section parameterization for fragmentation and the LISE++ 3EER model for in-flight fission. Primary beam intensities and energies based on 50 kW and 200 MeV/u for  $^{238}\text{U}$



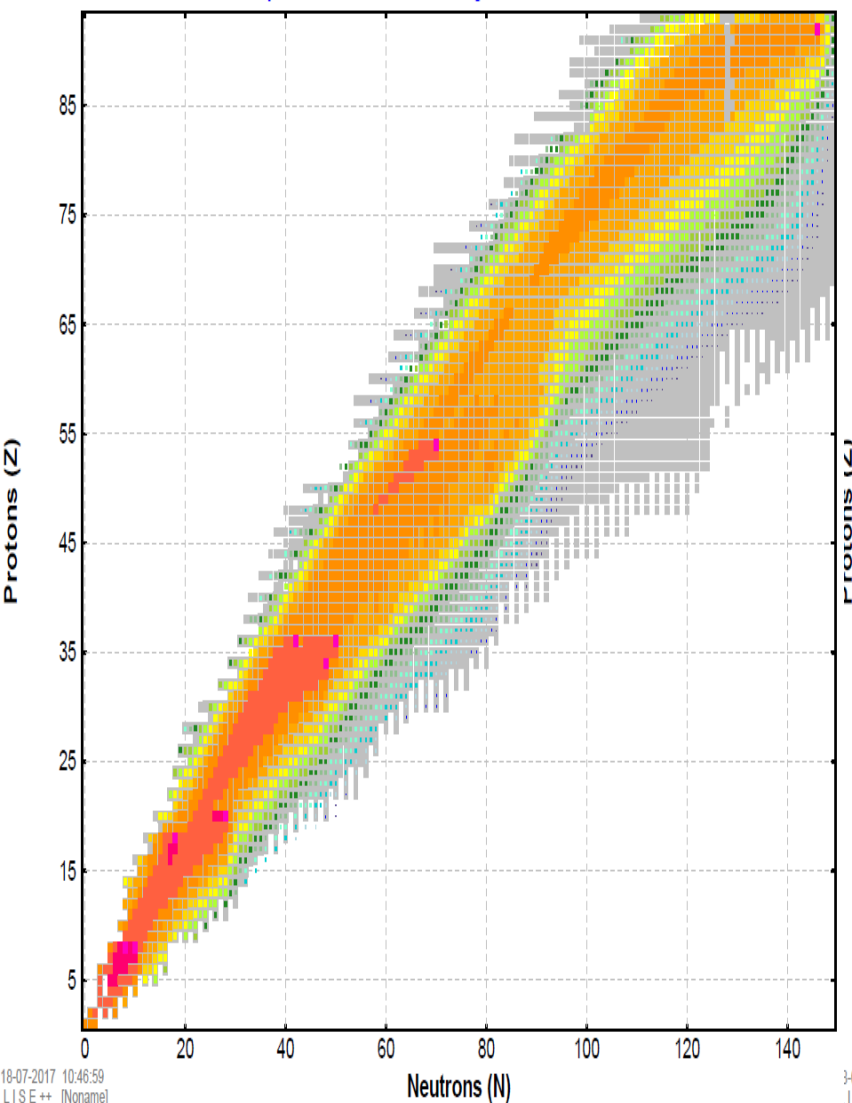
## FRIB fast beam rates (v.1.08) : 400 kW

<https://groups.nsci.msu.edu/frib/rates/fribrates.html> 1us flight is taken into account. The rates are estimated based on the EPAX 2.15 cross section parameterization for fragmentation and the LISE++ 3EER model for in-flight fission. Primary beam intensities and energies based on 400 kW and 200 MeV/u for  $^{238}\text{U}$



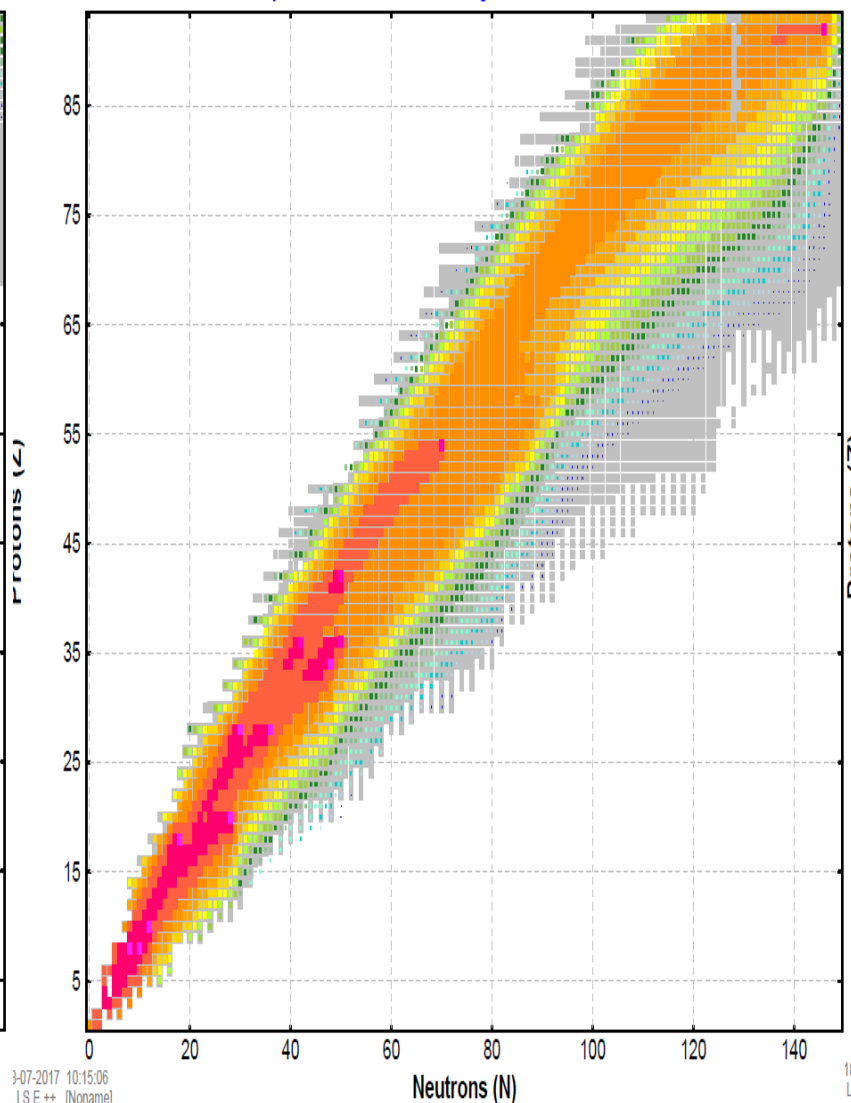
## FRIB fast beam rates (v.1.08a) : 1st year

1st year operation! 9 beams @ I=10kW. 1 $\mu$ s flight is taken into account. The rates are estimated based on the EPAX 2.15 cross section parameterization for fragmentation and the LISE++ 3EER model for in-flight fission. Primary beam intensities and energies based on 10 kW and 200 MeV/u for  $^{238}\text{U}$



## FRIB fast beam rates (v.1.08b) : 2nd year

2nd year operation! 13 beams @ I=50kW. 1 $\mu$ s flight is taken into account. The rates are estimated based on the EPAX 2.15 cross section parameterization for fragmentation and the LISE++ 3EER model for in-flight fission. Primary beam intensities and energies based on 50 kW and 200 MeV/u for  $^{238}\text{U}$



## FRIB fast beam rates (v.1.08) : 400 kW

<https://groups.nsl.msu.edu/fribrates/fribrates.html> 1 $\mu$ s flight is taken into account. The rates are estimated based on the EPAX 2.15 cross section parameterization for fragmentation and the LISE++ 3EER model for in-flight fission. Primary beam intensities and energies based on 400 kW and 200 MeV/u for  $^{238}\text{U}$

