BEAM LIST FOR STAND-ALONE OPERATION AT REA3, REA6, OR STOPPED BEAM AREA

The following list includes stable and long-lived radioactive beams that may be run at ReA3, ReA6,
or the stopped beam area in stand-alone mode (that is, not coupled to the FRIB linac).
Please note that beams of long-lived and rare stable isotopes are subject to availability of material at the time of the experiment.
Beams marked 'extracted' have been observed. Other stable isotopes of the same element are likely available as well.
Beams that are not on the beam list may be requested in discussion with the stopped and reaccelerated beam operations department.

Element	Z	A	Max rate pps **	Q	Max E ReA3 (MeV/u)	Max E ReA6 MeV/u	T1/2 ***	Abundance %	Extracted
Li	3	6	1.0E+07	2	4.0	8.0		7.6	
		7	1.0E+07	3	5.1	10.3		92.4	Yes
Be	4	7	4.0E+03	3	5.1	10.3	53 days		Yes
		9	1.0E+07	4	5.3	10.7		100	
		10	3.0E+06	4	4.8	9.6	1.5e6 y		Yes
B	5	10	1.0E+06	4	4.8	9.6		20	Yes
		11	2.6E+06	5	5.5	10.9		80	
C	6	12	1.0E+08	5	5.0	10.0		98.9	Yes
		13	1.0E+08	6	5.5	11.1		1.1	Yes
N	7	14	1.0E+08	6	5.1	10.3		99.6	Yes
		15	1.0E+07	7	5.6	11.2		0.4	Yes
O	8	16	1.0E+08	7	5.3	10.5		99.8	Yes
		17	1.0E+05	8	5.6	11.3		0.04	
		18	1.0E+07	8	5.3	10.7		0.2	Yes
F	9	19	1.0E+06	9	5.7	11.4		100	Yes
Ne	10	20	1.0E+09	9	5.4	10.8		90.5	Yes
		21	1.0E+06	10	5.7	11.4		0.3	Yes
		22	1.0E+06	10	5.5	10.9		9.3	Yes
Na	11	23	1.0E+07	11	5.7	11.5		100	Yes
Mg	12	24	1.0E+07	11	5.5	11.0		79	
		25	1.0E+07	11	5.3	10.6		10	
		26	1.0E+07	11	5.1	10.2		11	Yes
Al	13	26	2.5E+06	12	5.5	11.1	7e5 y		Yes
		27	1.0E+08	12	5.3	10.7		100	Yes
Si	14	28	1.0E+07	13	5.6	11.1		92.2	Yes
		29	1.0E+07	13	5.4	10.8		4.7	Yes
		30	1.0E+07	13	5.2	10.4		3.1	Yes
		32	1.4E+05	13	4.9	9.8	153 y		Yes
P	15	31	1.0E+07	14	5.4	10.8		100	
		33	5.0E+03	14	5.1	10.2	25 days		
S	16	32	1.0E+06	15	5.6	11.3		95	Yes
		33	1.0E+07	14	5.1	10.2		0.75	
		34	1.0E+07	14	4.9	9.9		4.3	
		36	1.0E+05	14	4.7	9.3		0.01	
Cl	17	35	1.0E+07	15	5.1	10.3		75.8	Yes
		37	1.0E+07	15	4.9	9.7		24.2	Yes
Ar	18	36	1.0E+07	16	5.3	10.7		0.3	
		38	1.0E+05	16	5.1	10.1		0.06	Yes
		40	5.0E+08	16	4.8	9.6		99.6	Yes
K	19	39	1.0E+07	17	5.2	10.5		93.3	Yes
		41	1.0E+07	17	5.0	10.0		6.7	Yes
Ca	20	40	1.0E+06	19	5.7	11.4		97	Yes
		41	9.0E+05	17	5.0	10.0	1e5 y		
		42	1.0E+06	17	4.9	9.7		0.6	
		43	1.0E+06	18	5.0	10.0		0.1	
		44	1.0E+06	18	4.9	9.8		2	
		46	1.0E+06	18	4.7	9.4		0.004	
		48	1.0E+06	17	4.3	8.5		0.19	Yes
Sc	21	45	1.0E+06	19	5.1	10.1		100	

Element	Z	A	Max rate pps **	Q	Max E ReA3 (MeV/u)	Max E ReA6 MeV/u	T1/2 ***	Abundance %	Extracted
Ti	22	46	1.0E+06	20	5.2	10.4		8.3	
		47	1.0E+06	20	5.1	10.2		7.4	
		48	1.0E+06	19	4.8	9.5		73.7	Yes
		49	1.0E+06	20	4.9	9.8		5.4	Yes
		50	1.0E+06	20	4.8	9.6		5.2	
Cr	24	50	1.0E+06	22	5.3	10.6		4.35	Yes
		52	1.0E+06	22	5.1	10.2		83.8	
		53	1.0E+06	22	5.0	10.0		9.5	
		54	1.0E+06	22	4.9	9.8		2.4	
Fe	26	54	1.0E+06	24	5.3	10.7		5.8	
		55	2.4E+04	24	5.2	10.5	2.7 y		
		56	1.0E+06	23	4.9	9.9		91.8	Yes
		57	1.0E+06	24	5.1	10.1		2.1	
		58	1.0E+06	24	5.0	9.9		0.3	Yes
		59	1.1E+04	24	4.9	9.8	44 days		
Ni	28	60	1.0E+06	26	5.2	10.4		26.2	
		61	1.0E+06	26	5.1	10.2		1.1	Yes
		62	1.0E+06	26	5.0	10.1		3.6	Yes
		63	4.4E+04	26	5.0	9.9	101 y		
		64	1.0E+06	26	4.9	9.8		0.93	
Cu	29	63	1.0E+06	26	5.0	9.9		69.1	
		65	1.0E+06	27	5.0	10.0		30.9	
Zn	30	64	1.0E+06	27	5.1	10.1		49.2	
		66	1.0E+06	28	5.1	10.2		27.8	
		67	1.0E+06	28	5.0	10.0		4	
		68	1.0E+06	28	4.9	9.9		18.5	
		70	1.0E+05	28	4.8	9.6		0.6	
Ga	31	69	1.0E+06	29	5.0	10.1		60.1	
		71	1.0E+06	29	4.9	9.8		39.9	
Ge	32	70	1.0E+06	29	5.0	9.9		20.6	Yes
		72	1.0E+06	29	4.8	9.7		27.5	
		73	1.0E+06	29	4.8	9.5		7.8	
		74	1.0E+06	29	4.7	9.4		36.5	
		76	1.0E+06	29	4.6	9.2		7.8	
As	33	73	6.3E+04	29	4.8	9.5	80 d		Yes
		75	1.0E+05	29	4.6	9.3		100	Yes
Se	34	74	1.0E+05	32	5.2	10.4		0.9	
		76	1.0E+06	32	5.1	10.1		9.4	
		77	1.0E+06	32	5.0	10.0		7.6	
		78	1.0E+06	32	4.9	9.8		23.8	
		80	1.0E+06	32	4.8	9.6		49.6	
		82	1.0E+06	32	4.7	9.4		8.7	
Br	35	79	1.0E+06	32	4.9	9.7		50.7	
		81	1.0E+06	32	4.7	9.5		49.3	
Kr	36	78	1.0E+07	32	4.9	9.8		0.36	
		80	1.0E+07	32	4.8	9.6		2.3	
		82	1.0E+07	32	4.7	9.4		11.6	
		83	1.0E+07	32	4.6	9.3		11.5	
		84	1.0E+07	32	4.6	9.1		57	Yes
		86	1.0E+07	32	4.5	8.9		17.3	Yes
Rb	37	83	2.6E+04	32	4.6	9.3	86.2 d		
		85	1.0E+07	32	4.5	9.0		72.2	Yes
		87	4.0E+06	32	4.4	8.8		27.8	Yes
Sr	38	84	1.0E+06	32	4.6	9.1		0.56	
		86	1.0E+06	32	4.5	8.9		10	
		87	1.0E+06	32	4.4	8.8		7	
		88	1.0E+06	32	4.4	8.7		82.6	Yes
Pd	46	102	1.0E+05	37	4.4	8.7		1	
		104	1.0E+06	37	4.3	8.5		11.1	

Element	Z	A	Max rate pps **	Q	Max E ReA3 (MeV/u)	Max E ReA6 MeV/u	T1/2 ***	Abundance %	Extracted
		105	1.0E+06	37	4.2	8.5		22.3	
		106	1.0E+06	37	4.2	8.4		27.3	
		108	1.0E+06	37	4.1	8.2		26.5	
		110	1.0E+06	37	4.0	8.1		11.7	
Ag	47	107	1.0E+06	37	4.1	8.3		51.8	Yes
		109	1.0E+06	37	4.1	8.1		48.2	
Cd	48	106	1.0E+06	38	4.3	8.6		1.25	
		108	1.0E+05	38	4.2	8.4		0.9	
		110	1.0E+06	38	4.1	8.3		12.5	
		111	1.0E+06	38	4.1	8.2		12.8	
		112	1.0E+06	38	4.1	8.1		24.1	Yes
		113	1.0E+06	38	4.0	8.1		12.2	
		114	1.0E+06	38	4.0	8.0		28.7	Yes
		116	1.0E+06	38	3.9	7.9		7.5	
In	49	113	1.0E+06	38	4.0	8.1		4.3	
		115	1.0E+06	38	4.0	7.9		95.7	
Sn	50	112	1.0E+06	39	4.2	8.4		1	Yes
		114	1.0E+06	39	4.1	8.2		0.66	
		115	1.0E+06	39	4.1	8.1		0.34	
		116	1.0E+06	39	4.0	8.1		14.5	Yes
		117	1.0E+06	39	4.0	8.0		24.2	
		118	1.0E+06	39	4.0	7.9		8.6	
		119	1.0E+06	39	3.9	7.9		8.6	
		120	1.0E+06	39	3.9	7.8		32.6	Yes
		122	1.0E+06	39	3.8	7.7		4.6	Yes
		124	1.0E+06	39	3.8	7.5		5.8	Yes
Sb	51	121	1.0E+06	40	4.0	7.9		57.2	
		123	1.0E+06	40	3.9	7.8		42.8	
Te	52	120	1.0E+05	41	4.1	8.2		0.09	Yes
		122	1.0E+06	41	4.0	8.1		2.6	
		123	1.0E+06	41	4.0	8.0		0.9	
		124	1.0E+06	41	4.0	7.9		4.7	
		125	1.0E+06	41	3.9	7.9		7.1	
		126	1.0E+06	41	3.9	7.8		18.8	
		128	1.0E+06	41	3.8	7.7		31.7	
		130	1.0E+06	41	3.8	7.6		34.1	Yes
I	53	127	1.0E+06	41	3.9	7.7		100	
Xe	54	124	1.0E+06	42	4.1	8.1		0.1	
		126	1.0E+06	42	4.0	8.0		0.08	
		128	1.0E+06	42	3.9	7.9		1.9	
		129	1.0E+06	42	3.9	7.8		26.4	Yes
		130	1.0E+06	42	3.9	7.8		4.1	
		131	1.0E+06	42	3.8	7.7		21.2	Yes
		132	1.0E+06	42	3.8	7.6		26.9	Yes
		134	1.0E+06	42	3.8	7.5		10.4	
		136	1.0E+06	42	3.7	7.4		8.9	
Cs	55	133	1.0E+06	43	3.9	7.8		100	Yes
Ba	56	130	1.0E+06	43	4.0	7.9		0.1	Yes
		132	1.0E+06	43	3.9	7.8		0.1	Yes
		134	1.0E+06	43	3.9	7.7		2.4	
		135	1.0E+06	43	3.8	7.6		6.6	
		136	1.0E+06	43	3.8	7.6		7.9	
		137	1.0E+06	43	3.8	7.5		11.2	
		138	1.0E+06	43	3.7	7.5		71.7	
Ta	73	181	1.0E+07	TBD	TBD	TBD		100	Yes
Th	90	227	TBD	TBD	TBD	TBD	19d		
		229	TBD	TBD	TBD	TBD	7.9ky		Yes
		230	TBD	TBD	TBD	TBD	75ky		
		232	TBD	TBD	TBD	TBD		100	Yes

** Intensities are quoted for the charge states indicated. Intensities can vary with the charge state and energy.
Higher energies for heavy isotopes can be obtained with reduced intensity.
Higher intensities may be obtained by choosing a lower charge state than indicated, which would also come at alower energy.
Please contact the Manager for User Relations for a specific energy or beam intensity.
*** Half-lives are given for the long-lived isotopes. Isotopes with no half-lives given are stable.