Accelerator configuration	Beam	E [MeV] 2022	E [MeV] 2023	E/A [MeV/A] 2022	E/A [MeV/A] 2023	I_{target} [pnA]
T	H(**)	28.2	28.2	28.2	28.2	25.0
T	^{2}H (*)(**)	28.2	28.2	14.1	14.1	25.0
T	$^{6}Li^{3+}$ (*)(**)	56.2	56.2	9.4	9.4	25.0
T	$^{7}Li^{3+}$(**)	56.2	56.2	8.0	8.0	25.0
T	$^{10}B^{5+}$ (*)	84.2	84.2	8.4	8.4	10.4
T	$^{11}B^{5+}$	84.2	84.2	7.7	7.7	10.4
T	$^{12}C^{6+}$	98.2	98.2	8.2	8.2	27.3
T	$^{13}C^{6+}$ (*)	98.2	98.2	7.6	7.6	27.3
T	$^{14}N^{6+}$	91.9	91.9	6.6	6.6	10.0
T	$^{15}N^{5+}$ (*)	77.9	77.9	5.2	5.2	5.1
T	$^{16}O^{8+}$	126.2	126.2	7.9	7.9	4.8
T	$^{17}O^{8+}$(*)	119.2	119.2	7.0	7.0	4.2
T	$^{18}O^{8+}$ (*)	119.2	119.2	6.6	6.6	4.2
T	$^{19}F^{9+}$	126.2	126.2	6.6	6.6	12.6
T	$^{24}Mg^{8+}$	125.6	125.6	5.2	5.2	3.6
T	$^{26}Mg^{8+}$ (*)	125.6	125.6	4.8	4.8	3.3
T	$^{27}Al^{11+}$	157.7	157.7	5.8	5.8	3.1
T	$^{28}Si^{12+}$	175.2	175.2	6.3	6.3	2.4
T	$^{29}Si^{10+}$	154.2	154.2	5.3	5.3	2.7
T	$^{30}Si^{9+}$ (*)	140.2	140.2	4.7	4.7	5.9
T	$^{32}S^{13+}$	185.7	185.7	5.8	5.8	4.7
T	$^{33}S^{14+}$ (*)	192.7	192.7	5.8	5.8	1.7
T	$^{34}S^{10+}$ (*)	154.2	154.2	4.5	4.5	3.9
T	$^{36}S^{12+}$ (*)	168.2	168.2	4.7	4.7	2.7
T	$^{35}Cl^{14+}$	196.2	196.2	5.6	5.6	2.7
T	$^{37}Cl^{13+}$	185.7	185.7	5.0	5.0	2.8
T	$^{40}Ca^{10+}$	153.8	153.8	3.8	3.8	2.3
T	$^{42}Ca^{10+}$ (*)	153.8	153.8	3.7	3.7	2.3
T	$^{48}Ca^{10+}$ (*)	139.9	139.9	2.9	2.9	2.5
T	$^{48}Ti^{14+}$	195.9	195.9	4.1	4.1	2.1
T	$^{50}Ti^{9+}$ (*)	136.7	136.7	2.7	2.7	2.9
T	$^{50}Cr^{10+}$ (*)	153.6	153.6	3.1	3.1	2.3
T	$^{52}Cr^{10+}$	153.6	153.6	3.0	3.0	2.3
T	$^{54}Fe^{12+}$ (*)	182.2	182.2	3.4	3.4	2.5
T	$^{56}Fe^{12+}$	182.2	182.2	3.3	3.3	2.3
T	$^{58}Ni^{19+}$	251.2	251.2	4.3	4.3	1.5
T	$^{60}Ni^{18+}$	241.7	241.7	4.0	4.0	1.7
T	$^{64}Ni^{19+}$(*)	250.2	250.2	3.9	3.9	1.9
T	$^{63}Cu^{20+}$	262.0	262.0	4.2	4.2	1.4
T	$^{65}Cu^{16+}$	220.0	220.0	3.4	3.4	1.9
T	$^{64}Zn^{19+}$	245.8	245.8	3.8	3.8	1.6
T	$^{66}Zn^{12+}$	179.4	179.4	2.7	2.7	2.2
T	$^{68}Zn^{12+}$	179.5	179.5	2.6	2.6	2.1
T	$^{70}Zn^{11+}$ (*)	165.5	165.5	2.4	2.4	3.9
T	$^{74}Ge^{18+}$	241.7	241.7	3.3	3.3	2.0
T	$^{76}Ge^{13+}$	196.2	196.2	2.6	2.6	2.1
T	$^{74}Se^{18+}$ (*)	241.7	241.7	3.3	3.3	1.7
T	$^{76}Se^{13+}$	196.2	196.2	2.6	2.6	3.0
T	$^{77}Se^{13+}$	196.2	196.2	2.5	2.5	3.8

T	$^{78}Se^{17+}$	231.2	231.2	3.0	3.0	1.7
T	$^{80}Se^{17+}$	231.2	231.2	2.9	2.9	1.8
T	$^{82}Se^{17+}$	231.2	231.2	2.8	2.8	1.8
T	$^{79}Br^{18+}$	245.2	245.2	3.1	3.1	1.6
T	$^{81}Br^{18+}$	245.2	245.2	3.0	3.0	1.6
T	$^{90}Zr^{13+}$	194.0	194.0	2.2	2.2	1.7
T	$^{91}Zr^{11+}$	166.0	166.0	1.8	1.8	0.7
T	$^{92}Zr^{12+}$	180.0	180.0	2.0	2.0	1.9
T	$^{94}Zr^{13+}$ (*)	194.1	194.1	2.1	2.1	1.8
T	$^{96}Zr^{13+}$ (*)	194.1	194.1	2.0	2.0	1.7
T	$^{92}Mo^{19+}$	250.3	250.3	2.7	2.7	1.9
T	$^{94}Mo^{12+}$	180.0	180.0	1.9	1.9	2.5
T	$^{95}Mo^{13+}$	194.1	194.1	2.0	2.0	2.5
T	$^{96}Mo^{13+}$	194.1	194.1	2.0	2.0	2.5
T	$^{97}Mo^{12+}$	180.1	180.1	1.9	1.9	2.4
T	$^{98}Mo^{13+}$	194.2	194.2	2.0	2.0	2.4
T	$^{100}Mo^{12+}$	180.2	180.2	1.8	1.8	2.3
T	$^{107}Ag^{15+}$	224.2	224.2	2.1	2.1	1.9
T	$^{109}Ag^{15+}$	224.2	224.2	2.1	2.1	1.8
T	$^{116}Sn^{13+}$	196.0	196.0	1.7	1.7	2.9
T	$^{120}Sn^{14+}$	210.2	210.2	1.8	1.8	2.8
T	$^{127}I^{15+}$	224.2	224.2	1.8	1.8	1.6
T	$^{197}Au^{16+}$	238.2	238.2	1.2	1.2	1.5
T-A	$^{12}C^{6+}$	250.7	269.6	20.9	22.5	2.0
T-A	$^{13}C^{6+}$(*)	250.9	270.3	19.3	20.8	2.0
P-A	$^{14}N^{4+}$	167.3	189.7	12.0	13.6	2.0
P-A	$^{15}N^{4+}$ (*)	169.0	192.2	11.3	12.8	2.0
T-A	$^{16}O^{8+}$	325.0	350.5	20.3	21.9	2.0
T-A	$^{17}O^{7+}$	298.9	322.2	17.6	19.0	2.0
T-A	$^{18}O^{7+}$	301.3	324.9	16.7	18.1	2.0
T-A	$^{19}F^{7+}$	303.5	327.4	16.0	17.2	2.0
P-A	$^{20}Ne^{5+}$	213.2	243.1	10.7	12.2	2.0
P-A	$^{22}Ne^{5+}$	215.2	247.4	9.8	11.2	2.0
P-A	$^{24}Mg^{7+}$	291.7	330.5	12.2	13.8	2.0
P-A	$^{25}Mg^{7+}$ (*)	293.6	333.2	11.7	13.3	2.0
P-A	$^{26}Mg^{7+}$ (*)	295.3	335.7	11.4	12.9	2.0
T-A	$^{27}Al^{8+}$	353.6	382.4	13.1	14.2	2.0
T-A	$^{28}Si^{10+}$	430.1	464.8	15.4	16.6	2.4
T-A	$^{29}Si^{8+}$	355.8	385.0	12.3	13.3	1.7
T-A	$^{30}Si^{8+}$ (*)	356.6	386.1	11.9	12.9	1.3
T-A	$^{32}S^{12+}$	502.0	543.4	15.7	17.0	2.0
T-A	$^{33}S^{12+}$	504.0	545.6	15.3	16.5	2.5
T-A	$^{36}S^{10+}$(*)	441.2	477.8	12.3	13.3	1.0
T-A	$^{35}Cl^{10+}$	440.2	476.6	12.6	13.6	5.5
T-A	$^{37}Cl^{10+}$	442.1	478.9	11.9	12.9	2.4
P-A	$^{36}Ar^{9+}$ (*)	383.7	437.6	10.7	12.2	10.2
P-A	$^{38}Ar^{9+}$ (*)	386.4	441.9	10.2	11.6	10.2
P-A	$^{40}Ar^{9+}$	388.9	446.0	9.7	11.1	10.2
P-A	$^{40}Ca^{11+}$	462.6	525.3	11.6	13.1	8.3
P-A	$^{42}Ca^{11+}$(*)	465.9	530.2	11.1	12.6	8.4
P-A	$^{43}Ca^{11+}$(*)	467.5	532.6	10.9	12.4	8.4
P-A	$^{44}Ca^{11+}$(*)	469.0	534.9	10.7	12.2	8.4
P-A	$^{46}Ca^{11+}$(*)	471.7	539.2	10.3	11.7	8.4
P-A	$^{48}Ca^{10+}$(*)	435.0	502.1	9.1	10.5	9.2
T-A	$^{48}Ti^{11+}$	488.5	530.1	10.2	11.0	1.5
T-A	$^{54}Fe^{11+}$ (**)	488.9	531.1	9.1	9.8	0.3

T-A	$^{58}Ni^{16+}$	682.0	741.0	11.8	12.8	1.0
P-A	$^{64}Zn^{17+}$(*)	718.6	817.2	11.2	12.8	10.8
P-A	$^{66}Zn^{17+}$(*)	721.7	822.0	10.9	12.5	5.4
P-A	$^{67}Zn^{17+}$(*)	723.3	824.3	10.8	12.3	10.8
P-A	$^{68}Zn^{17+}$(*)	724.7	826.5	10.7	12.2	10.8
P-A	$^{70}Zn^{17+}$(*)	727.6	831.0	10.4	11.9	10.8
T-A	$^{63}Cu^{13+}$	575.0	625.0	9.1	9.1	5.3
T-A	$^{65}Cu^{12+}$	529.4	575.9	8.1	8.1	1.3
T-A	$^{74}Ge^{13+}$	569.5	620.0	7.7	7.7	1.0
P-A	$^{78}Kr^{15+}$ (*)	658.7	763.1	8.4	9.8	15.4
P-A	$^{80}Kr^{15+}$ (*)	660.1	766.1	8.3	9.6	15.4
P-A	$^{82}Kr^{15+}$ (*)	661.4	769.1	8.1	9.4	15.4
P-A	$^{83}Kr^{15+}$ (*)	662.4	770.5	8.0	9.3	15.4
P-A	$^{84}Kr^{15+}$ (*)	662.6	771.9	7.9	9.2	15.4
P-A	$^{86}Kr^{15+}$ (*)	663.6	774.6	7.7	9.0	15.4
T-A	$^{79}Br^{13+}$	564.8	615.4	7.1	7.5	1.0
T-A	$^{81}Br^{13+}$	562.5	613.2	6.9	7.5	0.9
T-A	$^{77}Se^{12+}$	518.0	564.7	6.7	6.9	1.0
T-A	$^{78}Se^{12+}$	516.7	563.4	6.6	6.9	1.5
T-A	$^{80}Se^{12+}$	513.9	560.5	6.4	6.8	1.5
T-A	$^{82}Se^{12+}$	510.9	557.4	6.2	6.8	1.4
T-A	$^{90}Zr^{12+}$(**)	492.8	538.6	5.5	6.0	0.6
T-A	$^{94}Zr^{12+}$(**)	484.2	529.4	5.2	5.6	0.5
T-A	$^{96}Zr^{12+}$(**)	479.5	524.4	5.0	5.5	0.5
P-A	$^{93}Nb^{16+}$(*)	708.5	828.0	7.6	8.9	4.6
P-A	$^{92}Mo^{21+}$(*)	905.8	1037.9	9.8	11.3	3.3
P-A	$^{94}Mo^{21+}$(*)	908.1	1041.9	9.7	11.1	3.3
P-A	$^{95}Mo^{21+}$(*)	909.3	1043.8	9.6	11.0	3.3
P-A	$^{96}Mo^{21+}$ (*)	910.3	1045.7	9.5	10.9	3.3
P-A	$^{97}Mo^{21+}$(*)	911.4	1047.5	9.4	10.8	3.3
P-A	$^{98}Mo^{21+}$ (*)	912.4	1049.4	9.3	10.7	3.3
P-A	$^{100}Mo^{21+}$ (*)	914.4	1053.0	9.1	10.5	3.3
P-A	$^{112}Sn^{21+}$ (*)	924.2	1072.6	8.3	9.6	4.3
P-A	$^{114}Sn^{21+}$ (*)	925.5	1075.6	8.1	9.4	4.3
P-A	$^{115}Sn^{21+}$ (*)	926.2	1077.0	8.1	9.4	4.3
P-A	$^{116}Sn^{21+}$ (*)	926.8	1078.5	8.0	9.3	4.3
P-A	$^{117}Sn^{21+}$ (*)	927.3	1079.9	7.9	9.2	4.3
P-A	$^{118}Sn^{21+}$ (*)	927.9	1081.3	7.9	9.2	4.3
P-A	$^{119}Sn^{21+}$ (*)	928.5	1082.7	7.8	9.1	4.3
P-A	$^{120}Sn^{21+}$ (*)	929.0	1084.0	7.7	9.0	4.3
P-A	$^{122}Sn^{21+}$ (*)	930.0	1086.7	7.6	8.9	4.3
P-A	$^{124}Sn^{21+}$ (*)	930.9	1089.3	7.5	8.8	4.3
P-A	$^{124}Xe^{27+}$ (*)	1171.0	1345.5	9.4	10.9	3.4
P-A	$^{126}Xe^{27+}$ (*)	1173.2	1349.2	9.3	10.7	3.4
P-A	$^{128}Xe^{27+}$ (*)	1175.2	1352.8	9.2	10.6	3.4
P-A	$^{129}Xe^{27+}$ (*)	1176.1	1354.6	9.1	10.5	3.4
P-A	$^{130}Xe^{27+}$ (*)	1177.1	1356.4	9.1	10.4	3.4
P-A	$^{131}Xe^{27+}$ (*)	1178.0	1358.1	9.0	10.4	3.4
P-A	$^{132}Xe^{27+}$ (*)	1178.9	1359.8	8.9	10.3	3.4
P-A	$^{134}Xe^{27+}$ (*)	1180.7	1363.2	8.8	10.2	3.4
P-A	$^{136}Xe^{27+}$ (*)	1182.4	1366.5	8.7	10.0	3.4
P-A	$^{144}Sm^{26+}$ (*)	1147.7	1335.8	8.0	9.3	4.6
P-A	$^{146}Sm^{26+}$ (*)	1148.9	1338.6	7.9	9.2	4.6
P-A	$^{147}Sm^{26+}$ (*)	1149.4	1340.0	7.8	9.1	4.6
P-A	$^{148}Sm^{26+}$ (*)	1149.9	1341.4	7.8	9.1	4.6
P-A	$^{149}Sm^{26+}$ (*)	1150.5	1342.8	7.7	9.0	4.6
P-A	$^{150}Sm^{26+}$ (*)	1151.0	1344.1	7.7	9.0	4.6
P-A	$^{152}Sm^{26+}$ (*)	1151.9	1346.8	7.6	8.9	4.6
P-A	$^{154}Sm^{26+}$ (*)	1152.8	1349.4	7.5	8.9	4.6

P-A	$^{156}Dy^{26+}$ (*)	1153.7	1351.9	7.4	8.7	3.5
P-A	$^{158}Dy^{26+}$ (*)	1154.5	1354.4	7.3	8.6	3.5
P-A	$^{160}Dy^{26+}$ (*)	1155.2	1356.8	7.2	8.5	3.5
P-A	$^{161}Dy^{26+}$ (*)	1155.5	1358.0	7.2	8.4	3.5
P-A	$^{162}Dy^{26+}$ (*)	1155.9	1359.2	7.1	8.4	3.5
P-A	$^{163}Dy^{26+}$ (*)	1156.2	1360.4	7.1	8.3	3.5
P-A	$^{164}Dy^{26+}$ (*)	1156.5	1361.5	7.1	8.3	3.5
P-A	$^{164}Dy^{28+}$ (*)	1240.7	1450.8	7.6	8.8	1.7
P-A	$^{180}W^{29+}$ (*)	1289.1	1515.3	7.2	8.4	3.2
P-A	$^{182}W^{29+}$ (*)	1289.7	1517.6	7.1	8.3	3.2
P-A	$^{183}W^{29+}$ (*)	1290.0	1518.8	7.0	8.3	3.2
P-A	$^{184}W^{29+}$ (*)	1290.3	1520.0	7.0	8.3	3.2
P-A	$^{186}W^{28+}$ (*)	1247.8	1476.8	6.7	7.9	4.9
P-A	$^{186}W^{29+}$ (*)	1290.9	1522.2	6.9	8.2	3.2
P-A	$^{197}Au^{30+}$(*)	1336.5	1579.8	6.8	8.0	3.0
P-A	$^{204}Pb^{32+}$(*)	1424.2	1678.4	7.0	8.2	2.2
P-A	$^{206}Pb^{32+}$(*)	1424.7	1680.6	6.9	8.2	2.2
P-A	$^{207}Pb^{32+}$(*)	1425.0	1681.7	6.9	8.1	2.2
P-A	$^{208}Pb^{32+}$(*)	1425.2	1682.9	6.9	8.1	2.2
P-A	$^{238}U^{32+}$ (**)		1712.6		7.2	0.7-1

Please note:

The values here reported should be intended as an example of possible beams of their kind.

• For T (TANDEM): as general rule, the TANDEM can supply between 30 MeV/AMU for 1H up to 1.5 MeV/AMU for 197Au. The examples listed, maximizes the beam energy (terminal at 14 MV) keeping around 25 nA at target. Different combinations of energies with higher currents are possible. For any further information please contact PACbeams@lnl.infn.it, specifying the energy, particle current and species required.

• For T-A/P-A (TANDEM - ALPI, PIAVE - ALPI): beams with lower than listed energies and currents are feasible. Combinations of slightly higher energies and smaller current or vice versa may be possible, but not guaranteed. For such cases and for any possible doubt, please contact PACbeams@lnl.infn.it, specifying the energy, particle current and species required.

A. For T-A and P-A the table assumes:

1. a terminal voltage of 14 MV of the XTU-Tandem;

2. for Tandem-ALPI complex, the currents are listed without considering the pulsing-chopper system. If it is needed, please contact PACbeams@lnl.infn.it for an estimate of the residual current, normally smaller by a factor of 5.3 with respect CW operation. Nominal pulsing frequency is 2.5 MHz;

3. Intensity limitations may derive from radiation protection requirements and Tandem stripper lifetime.

B. Values obtained with 2 stripping foils are underlined.

C. The isotopes that requires enriched source target materials are marked with **(*)**: the users must provide the enriched isotopes. For further details, please look at negative ions for Tandem beams and at positive ions for PIAVE beams

D. Users who select a beam marked with **(**)** are kindly advised to contact the Accelerator Division (PACbeams@lnl.infn.it) for technical information before submitting a proposal with this beam.

E. Possible accelerator configurations are: T-A (Tandem or Tandem-ALPI), P-A (PIAVE- ALPI).

For any additional information, please contact the Linac operation team (PACbeams@lnl.infn.it)