## $^{113}_{51}$Sb(p)

*Target isotope:* $^{112}_{50}$Sn $I^{\pi}_{\circ} = 0^+$ *Abundance:* 0.97(1) % $S_{\rm p} = 3044(22)$ keV

| $E_{\circ}$ [keV] | $2J^{\pi}$ | $\Gamma_{\rm p}$ [keV] | $\Gamma$ [keV] | $E^*_{\rm analog}$ [keV] | $S_{\rm pp}$ | $S_{\rm dp}$ | $E_{\rm cm}$ [keV] | $E^*$ [keV] | Ref. | |
|---|---|---|---|---|---|---|---|---|---|---|
| 6257 | $1^+$ | 10.3 | 40.1 | 0.0 | 0.50 | 1.16 | 6202(15) | 9246(40) | 66Ri06 | 66Lo06 |
| 6708 | $5^+$ | 0.48 | 13.3 | 410 | 0.08 | 0.154 | 6649(15) | 9693(40) | 66Ri06 | 66Lo06 |
| 6770 | $3^+$ | 3.5 | 33.5 | 498 | 0.27 | 0.746 | 6710(15) | 9754(40) | 66Ri06 | 66Lo06 |

Additional data on this isotope can be found in [93Ja05, 98Bl04, 87Ja03].
Comparison with (d,p)-reaction data for all A-odd antimony isotopes was given in [66Ri06].
Isobar analog in $^{112}$Sb to the ground state of $^{112}$Sn ($J^{\pi}$=$0^+$) was observed at the excitation $E^*$=6160(30) keV [96De55].
Values $E_{\circ}$ were calculated from $E_{\rm cm}$ values.

## $^{115}_{51}$Sb(p)

*Target isotope:* $^{114}_{50}$Sn $I^{\pi}_{\circ} = 0^+$ *Abundance:* 0.66(1) % $S_{\rm p} = 3733(20)$ keV

| $E_{\circ}$ [keV] | $2J^{\pi}$ | $\Gamma_{\rm p}$ [keV] | $\Gamma$ [keV] | $E^*_{\rm analog}$ [keV] | $S_{\rm pp}$ | $S_{\rm dp}$ | $E_{\rm cm}$ [keV] | $E^*$ [keV] | Ref. | |
|---|---|---|---|---|---|---|---|---|---|---|
| 6406(15) | $1^+$ | 8 | 38 | 0.0 | 0.34 | 0.96 | 6350(15) | 10083(15) | 66Ri06 | 66Lo06 |
| 6916(15) | $3^+$ | 5 | 36 | 497 | 0.28 | 0.619 | 6856(15) | 10589(15) | 66Ri06 | 66Lo06 |
| 7026(15) | $7^+$ | ⟨3⟩ | ⟨50⟩ | 613 | ⟨0.22⟩ | 0.192 | 6965(15) | 10698(15) | 66Ri06 | 66Lo06 |
| 7396(15) | $5^+$ | 1 | 50 | 987 | 0.026 | 0.117 | 7332(15) | 11065(15) | 66Ri06 | 66Lo06 |

Additional data on this isotope can be found in [99Bl28].
Values $E_{\circ}$ were calculated from $E_{\rm cm}$ values.

## $^{117}_{51}$Sb(p)

*Target isotope:* $^{116}_{50}$Sn $I^{\pi}_{\circ} = 0^+$ *Abundance:* 14.54(9) % $S_{\rm p} = 4405.6(89)$ keV

| $E_{\circ}$ [keV] | $2J^{\pi}$ | $\Gamma_{\rm p}$ [keV] | $\Gamma$ [keV] | $E^*_{\rm analog}$ [keV] | $S_{\rm pp}$ | $S_{\rm dp}$ | $E_{\rm cm}$ [keV] | $E^*$ [keV] | Ref. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6915(15) | $1^+$ | 16.5 | 49(5) | 0.0 | 0.58 | 0.647 | 6856(15) | 11262(10) | 66Ri06 | 66Ha16 | 66Lo06 |
| 7080(15) | $3^+$ | 8.3 | 49(5) | 160 | 0.43 | 0.549 | 7019(15) | 11425(10) | 66Ri06 | 66Lo06 | |
| 7941(15) | $5^+$ | 1.8 | 42 | 1030 | 0.040 | 0.061 | 7873(15) | 12279(15) | 66Ri06 | 66Lo06 | |
| 8104(15) | $5^+$ | 1.4 | 35 | 1190 | 0.035 | 0.033 | 8035(15) | 12441(15) | 66Ri06 | 66Lo06 | |
| 8240(15) | $7^-$ | | | 1310 | | 0.029 | 8170(15) | 12576(15) | 66Ri06 | | |

Additional data on this isotope can be found in [92Bl08, 68Ve08, 67Sc20].
Values $E_{\circ}$ were calculated from $E_{\rm cm}$ values.

*Target isotope:* $^{117}_{50}$Sn $I^{\pi}_{\circ} = 1/2^+$ *Abundance:* 7.68(7) % $S_p = 4887.5(33)$ keV

## $^{118}_{51}$Sb(p)

| $E_\circ$ [keV] | $J^\pi$ | $\Gamma_p$ [keV] | $\Gamma$ [keV] | $\Gamma_n$ [keV] | $E^*_{analog}$ [keV] | $E_{cm}$ [keV] | $E^*$ [keV] | Ref. | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 4476(8) | $0^+$ | 2.15 | 101(20) | 99(14) | 0.0 | 4440(20) | 9327(20) | 66Lo06 | 96Pa37 | |
| 5718 | $\langle 2^+ \rangle$ | | | | 1230 | 5670(20) | 10557(20) | 66Lo06 | 66Ri06 | |
| 6192 | | | | | 1700 | 6140(20) | 11027(20) | 66Lo06 | 66Ri06 | |
| 6525 | | | | | 2030 | 6470(20) | 11357(20) | 66Lo06 | 66Ri06 | |
| 6828 | | | | | 2330 | 6770(20) | 11657(20) | 66Lo06 | 66Ri06 | |
| 6979 | | | | | 2480 | 6920(20) | 11807(20) | 66Lo06 | 66Ri06 | |
| 7161 | | | | | 2660 | 7100(20) | 11987(20) | 66Lo06 | 66Ri06 | |
| 7231 | | 50 | 990 | | 2730 | 7170(20) | 12057(20) | 66Lo06 | 66Ri06 | 85GuZU |
| 7393 | | | | | 2890 | 7330(20) | 12217(20) | 66Lo06 | 66Ri06 | |
| 10015 | | 125 | 1090 | | | 9930 | 14817 | 85GuZU | | |

Additional data on this isotope can be found in [95Ki07, 87Ta12, 87Ja03, 76Be49].

The expected $J^\pi$ values of resonances are given according to the suggested in [66Ri06, 66Lo06] correspondence between the low-lying excited states in $^{120}$Sn and IAR in $^{120}$Sb.

Ten partial neutron decay widths determined from the study of $0^+$ resonance were given in [96Pa37].

Values $E_\circ$ were calculated from $E_{cm}$ values.

*Target isotope:* $^{118}_{50}$Sn $I^{\pi}_{\circ} = 0^+$ *Abundance:* 24.22(9) % $S_p = 5109.1(77)$ keV

## $^{119}_{51}$Sb(p)

| $E_\circ$ [keV] | $2J^\pi$ | $\Gamma_p$ [keV] | $\Gamma$ [keV] | $E^*_{analog}$ [keV] | $S_{pp}$ | $S_{dp}$ | $E_{cm}$ [keV] | $E^*$ [keV] | Ref. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7320(15) | $1^+$ | 10(5) | 39(9) | 0.0 | 0.38 | 0.586 | 7258(8) | 12368(12) | 66Ri06 | 66Ha16 | 66AlZY | |
| 7338(15) | $3^+$ | 6(1) | 32 | 23.9 | 0.23 | 0.515 | 7276(15) | 12386(17) | 66Ri06 | 66Lo06 | 66AlZY | |
| 8129(15) | $7^+$ | | | 787 | | | 8061 | 13170(20) | 92Ki24 | | | |
| 8260(15) | $3^+$ | | | 920 | | | 8191 | 13300(20) | 92Ki24 | | | |
| 8394(15) | $5^+$ | 3 | 50(5) | 1089 | 0.063 | 0.084 | 8323(9) | 13433(12) | 66Ri06 | 66Lo06 | 66Ha16 | 66AlZY |
| 8671(15) | $5^+$ | 1.7 | 40 | 1355 | | 0.014 | 8598(15) | 13708(17) | 66Ri06 | 66AlZY | | |
| 9258(15) | | $\langle 4 \rangle$ | $\langle 70 \rangle$ | | | | 9180 | 14290(20) | 66Ri06 | 66AlZY | | |

Additional data on this isotope can be found in [00Oh01, 68Al10, 68Ve08, 65Al07, 65Al12].

Values $E_\circ$ were calculated from $E_{cm}$ values.

*Target isotope:* $^{119}_{50}$Sn $I^{\pi}_{\circ} = 1/2^+$ *Abundance:* 8.59(4) % $S_p = 5644.5(75)$ keV

## $^{120}_{51}$Sb(p)

| $E_\circ$ [keV] | $J^\pi$ | $\Gamma_p$ [keV] | $\Gamma$ [keV] | $E^*_{analog}$ [keV] | $E_{cm}$ [keV] | $E^*$ [keV] | Ref. | |
|---|---|---|---|---|---|---|---|---|
| 4635(20) | $\langle 0^+ \rangle$ | | 40(5) | 0.0 | 4596 | 10204(30) | 66Lo06 | 66Ha16 |
| 5758(20) | | | | 1171.4 | 5710(20) | 11354(30) | 66Lo06 | 66Ri06 |

(continued) **$^{120}_{51}$Sb(p)**

| $E_\circ$ [keV] | $J^\pi$ | $\Gamma_p$ [keV] | $\Gamma$ [keV] | $E^*_{analog}$ [keV] | $E_{cm}$ [keV] | $E^*$ [keV] | Ref. | |
|---|---|---|---|---|---|---|---|---|
| 6403(20) | | | | 1875.0 | 6350(20) | 11994(30) | 66Lo06 | 66Ri06 |
| 6827(20) | | | | 2097.1 | 6770(20) | 12314(30) | 66Lo06 | 66Ri06 |
| 6918(20) | | | | 2290 | 6860(20) | 12504(30) | 66Lo06 | 66Ri06 |
| 7018(20) | | | | 2421.3 | 6960(20) | 12604(30) | 66Lo06 | 66Ri06 |
| 7200(20) | | | | 2586.8 | 7140(20) | 12784(30) | 66Lo06 | 66Ri06 |
| 7331(20) | | | | 2721.3 | 7270(20) | 12914(30) | 66Lo06 | 66Ri06 |
| 7452(20) | | | | 2835.2 | 7390(20) | 13034(30) | 66Lo06 | 66Ri06 |
| 7543(20) | | | | 2938 | 7480(20) | 13124(30) | 66Lo06 | 66Ri06 |

Additional data on this isotope can be found in [94Pa19, 87Ha32, 67Ki06, 87Ja03].

The expected $J^\pi$ values of resonances are given according to the suggested in [66Ri06, 66Lo06] correspondence between the low-lying excited states in $^{120}$Sn and IAR in $^{120}$Sb.

Values $E_\circ$ were calculated from $E_{cm}$ values.

The review of data on isobar analog states (IAS) seen in proton resonances as IAR was given in [87Ja03] where combined results from proton scattering experiments and from study of ($^3$He,$^3$H)-reaction including data for isotopes with Z=63-73 [83Ja07, 83Ja03] were presented. A-dependencies of escape and spreading widths of IAS-IAR in heavy nuclei are discussed in [93Ja05, 87Ja03].

The internal structure and parameters of IAS have been discussed in [83Au0A].

The compilation of Coulomb displacement energies was presented in [75Co0A].

*Target isotope:* $^{120}_{50}$Sn $I^\pi_\circ = 0^+$ *Abundance:* 32.58(9) % $S_p = 5778.6(21)$ keV **$^{121}_{51}$Sb(p)**

| $E_\circ$ [keV] | $2J^\pi$ | $\Gamma_p$ [keV] | $\Gamma$ [keV] | $E^*_{analog}$ [keV] | $S_{pp}$ | $S_{dp}$ | $E_{cm}$ [keV] | $E^*$ [keV] | Ref. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7557(15) | $3^+$ | 7.5 | 39 | 0.0 | 0.25 | 0.43 | 7495(15) | 13274(15) | 66Ri06 | 71Da18 | 66Lo06 |
| 7633(15) | $1^+$ | 24 | 60 | 60.3 | 0.42 | 0.39 | 7570(15) | 13349(15) | 66Ri06 | 71Da18 | 66Lo06 |
| 8693(15) | $3^+$ | 3 | 53 | 1120 | 0.037 | 0.065 | 8621(15) | 14400(15) | 66Ri06 | 71Da18 | 66Lo06 |
| 8998(15) | $3^+$ | 1.5 | 38 | 1432 | 0.023 | 0.029 | 8924(15) | 14703(15) | 66Ri06 | 71Da18 | 66Lo06 |
| 10175(20) | $7^-$ | 2.2 | 28 | 2589 | | | 10091 | 15869(20) | 75Ar04 | | |
| 10258(20) | $7^-$ | 10.8 | 70 | 2700 | | | 10173 | 15952(20) | 75Ar04 | | |
| 10518(20) | $\langle 7^- \rangle$ | 2.0 | 50 | 2927 | | | 10431 | 16210(20) | 75Ar04 | | |
| 10611(20) | $\langle 7^- \rangle$ | 1.3 | 42 | 3019 | | | 10523 | 16302(20) | 75Ar04 | | |
| 10708(20) | $\langle 7^- \rangle$ | 1.5 | 58 | 3138 | | | 10620 | 16398(20) | 75Ar04 | | |
| 10906(20) | $\langle 7^- \rangle$ | 2.3 | 78 | 3326 | | | 10816 | 16594(20) | 75Ar04 | | |
| 10979(20) | $3^-$ | 6.6 | 107 | 3396 | | | 10888 | 16667(20) | 75Ar04 | | |
| 11108(20) | $3^-$ | 5.0 | 52 | 3510 | | | 11016 | 16795(20) | 75Ar04 | | |
| 11254(20) | $\langle 3^- \rangle$ | 6.2 | 110 | 3680 | | | 11161 | 16940(20) | 75Ar04 | | |

Additional data on this isotope can be found in [91Ta18, 68Ve08].

Fitting parameter $\Gamma_\lambda$ from [75Ar04] is given instead of $\Gamma_p$.

Comparison with the results from the earlier work ([66Ri06] and others) is given in [75Ar04].

Values $E_\circ$ of the first four resonances were calculated from $E_{cm}$ values.

*Target isotope:* $^{122}_{50}$Sn $I^{\pi}_{\circ} = 0^+$ *Abundance:* 4.63(3) % $S_{\rm p} = 6566.5(29)$ keV

## $^{123}_{51}$Sb(p)

| $E_{\circ}$ [keV] | $2J^{\pi}$ | $\Gamma_{\rm p}$ [keV] | $\Gamma$ [keV] | $E^*_{\rm analog}$ [keV] | $S_{\rm pp}$ | $S_{\rm dp}$ | $E_{\rm cm}$ [keV] | $E^*$ [keV] | Ref. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7752(20) | $3^+$ | 7.4 | 42 | 20 | 0.19 | 0.434 | 7684 | 14256(20) | 66Ri06 | 75Ar04 | 66Lo06 | 66Ha16 |
| 7887(20) | $1^+$ | 14.3 | 59 | 150 | 0.23 | 0.356 | 7818 | 14389(20) | 66Ri06 | 75Ar04 | 66Lo06 | 66Ha16 |
| 8935(20) | $5^+$ | 3.4 | 41 | 1200 | 0.11 | 0.062 | 8867 | 15429(20) | 66Ri06 | 75Ar04 | 66Lo06 | |
| 9237(20) | $5^+$ | 2.7 | 47 | 1490 | 0.022 | 0.024 | 9172 | 15728(20) | 66Ri06 | 75Ar04 | 66Lo06 | |
| 10445(20) | $7^-$ | 19.6 | 94 | | | | | 16927(20) | | 75Ar04 | | |
| 10893(20) | $\langle 7^- \rangle$ | 8.0 | 140 | | | | | 17371(20) | | 75Ar04 | | |
| 11081(20) | $\langle 3^- \rangle$ | 30.0 | 202 | | | | | 17557(20) | | 75Ar04 | | |
| 11780(20) | $\langle 1^- \rangle$ | 27.0 | 1300 | | | | | 18251(20) | | 75Ar04 | | |

Additional data on this isotope can be found in [67Sc20].
Fitting parameter $\Gamma_{\lambda}$ from [75Ar04] is given instead of $\Gamma_{\rm p}$.
Comparison with data from (d,p) reaction is given in [75Ar04].
Values $E_{\rm cm}$ and $E^*$ were calculated from $E_{\circ}$ values.

*Target isotope:* $^{124}_{50}$Sn $I^{\pi}_{\circ} = 0^+$ *Abundance:* 5.79(5) % $S_{\rm p} = 7314.0(29)$ keV

## $^{125}_{51}$Sb(p)

| $E_{\circ}$ [keV] | $2J^{\pi}$ | $\Gamma_{\rm p}$ [keV] | $\Gamma$ [keV] | $E^*_{\rm analog}$ [keV] | $S_{\rm pp}$ | $S_{\rm dp}$ | $E_{\rm cm}$ [keV] | $E^*$ [keV] | Ref. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7928(20) | $3^+$ | 6.0 | 46(5) | 27.5 | 0.35 | 0.344 | 7864 | 15174(20) | 66Ri06 | 71Da18 | 66Lo06 | 75Ar04 | 72Se07 |
| 8136(20) | $1^+$ | 13.1 | 51 | 215.1 | 0.23 | 0.253 | 8022 | 15381(20) | 66Ri06 | 71Da18 | 66Lo06 | 75Ar04 | 72Se07 |
| 9182(20) | $\langle 5^+ \rangle$ | 1.9 | 58 | 1258 | 0.13 | 0.039 | 9104 | 16419(20) | 66Ri06 | 71Da18 | 66Lo06 | 75Ar04 | |
| 9469(20) | $\langle 5^+ \rangle$ | 0.7 | 33 | 1540 | 0.06 | 0.023 | 9386 | 16703(20) | 66Ri06 | 71Da18 | 66Lo06 | 75Ar04 | |
| 10593(20) | $7^-$ | 22.4 | 54(5) | 2767 | 0.67 | | 10529 | 17871(20) | 74Bo28 | 75Ar04 | 72Se07 | 71Da18 | |
| 11250(20) | $\langle 3^- \rangle$ | 42.6 | 211 | 3421 | 0.51 | | 11200 | 18470(20) | 71Da18 | | 75Ar04 | | |
| 11320(20) | $\langle 3^- \rangle$ | 1.7 | 29 | 3530 | | | 11141 | 18539(20) | 72Se07 | | 75Ar04 | | |
| 11745(20) | $\langle 1^- \rangle$ | 16 | 84 | 3830 | | | | 18961(20) | | | 75Ar04 | | |
| 11905(20) | $\langle 1^- \rangle$ | 33 | 136 | 4060 | | | | 19120(20) | | | 75Ar04 | | |

Additional data on this isotope can be found in [93Ka46, 67Sc20, 66Ri06].
Decay of the resonance at $E_{\circ}$ about 10650 keV by inelastic scattering is reported in [74Bo28].
Fitting parameter $\Gamma_{\lambda}$ from [75Ar04] is given instead of $\Gamma_{\rm p}$; $E^*$ are from [93Ka46].
Comparison with data from (d,p) reaction is given also in [75Ar04].
Values $E_{\rm cm}$ and $E^*$ were calculated from $E_{\circ}$ values.