

⁸⁸Sr(p,p'),(pol p,p) IAR 1970Co11,1968Co02

Type	Author	History Citation	Literature Cutoff Date
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Includes ⁸⁸Sr(p,p), ⁸⁸Sr(pol p,p'), ⁸⁸Sr(p,p'γ), ⁸⁸Sr(pol P,P'γ).

All studies measure excitation functions.

1970Co11: (p,p), (p,p') E=4.8 to 12 MeV. A total of 25 resonances reported in the E(p)=5 to 11 MeV range.

1968Co02 (also 1968Sh03,1966Co20): (p,p), (p,p') E=5.0 to 8.7 MeV. Measured σ(θ). 1968Co02 report 16 resonances in the

E(p)=5-8.4 range. 1968Sh03 studied resonances at E(p)(lab)=6100, 7000, 7070 and 7510 while 1966Co20 reported resonances at E(p)(lab)=5056, 6062, 6993 and 7063.

Data for selected resonances:

1983Ch41: (p,p) E=5.0 to 5.2 MeV. Measured σ(θ) and K-shell ionization probability for E(p)(lab)=5060, d_{5/2} resonance.

1976Ha47 (also 1975HaWT): (p,p'), (pol p,p'), (p,p'γ), (pol P,P'γ) E=7.00, 7.08, 7.53 MeV. Measured σ(θ), Ay(θ). Data for resonances at E(p)(lab)=7000, 7080, 7530.

1975Ra18: (p,p') E=5.0-7.1 MeV. Measured σ(θ). Resonances reported at E(p)(lab)=5056, 6062, 6910, 6987, 7064.

1975Ge14: (p,p) E=5.90 to 6.27 MeV. Measured σ(θ) for E(p)(lab)=6065, 3s_{1/2} resonance.

1974Cu04: (p,p'γ) E=5 MeV. Measured pγ coin., σ(θ), γ(θ) for resonance at E(p)(lab)=5070, 5/2⁺.

1973SI01: (p,p') E=7.65, 7.80, 7.92, 8.78, 9.75, 9.90 MeV. Measured σ(θ). Resonances reported at above E(p)(lab) energies.

1973Gr08: (pol p,p), E=4.7 to 5.1 MeV. Measured excitation functions of σ(θ) and analyzing power for E(p)(lab)=5070, d_{5/2} resonance.

1972Se10: (p,p). Measured Coulomb displacement energies.

1972Bo40 (also 1971Bo43): (pol P,P'γ) E=7.00, 7.08, 7.53 MeV. Measured σ(θ) and Ay(θ) for resonances at E(p)(lab)=7000, 7080, and 7530.

1971PrZR: (p,p) E=4.4-8.0 MeV.

1971Kr21: (p,p) E=4.5 to 6 MeV. Resonance at E(p)(lab)=5070.

1969Wi15: (pol p,p) E=5 to 8.5 MeV, measured σ(θ) and analyzing power. Resonances reported at E(p)(lab)=5090, 7010, 7090, 7530, 7810, 8210 and 8310.

1969El08: (pol p,p). Measured σ(θ), Ay(θ).

1964Fo03: (p,p) E=4.75-5.12 MeV. Resonance at E(p)(lab)=5080.

Theory and analysis: 1972Au04, 1972Sp02, 1972Co21, 1971Sp04, 1968Be12.

⁸⁹Y Levels

Γ_p from 1968Co02 is from Breit-Wigner fit to excitation functions of σ(θ) and analyzing power, unless indicated otherwise.

E(level) [†]	Jπ [‡]	Γ [#]	E(p)(C.M.) (keV)	Comments
12076 15	5/2 ⁺ @	16 keV 2	4999 15	Γ _p =5.5 keV 5 Γ: from 1973Gr08. Others: 16 keV (1968Co02), 19 keV (1971Kr21), 12 keV (1969Wi15), 20 keV (1970Co11). Γ _p : from 1973Gr08. Others: 8 keV (1968Co02), 6.3 keV (1971Kr21), 4 keV (1969Wi15). E(p)(lab)=5056 (1968Co02,1970Co11,1975Ra18), 5070 (1974Cu04, 1973Gr08,1971Kr21), 5090 (1969Wi15), 5080 (1964Fo03).
13070 15	(1/2 ⁺)	70 keV	5993 15	IAR of ⁸⁹ Sr g.s., 5/2 ⁺ . Γ _p =46 keV; Γ _γ = 11 eV 4 (1968Sh03) E(p)(lab)=6062 (1968Co02,1970Co11,1975Ra18), 6100 (1968Sh03), 6065 (1975Ge14).
13991 15	5/2 ⁺ @	50 keV	6914 15	IAR of 1032, 1/2 ⁺ In ⁸⁹ Sr. Γ _p =8 keV 4 Γ=32 keV (1970Co11). Γ _p : from 1973Gr08. Others: 11 keV (1968Co02), 5 keV (1969Wi15), 32 keV (1970Co11). Γ _γ (7000+7070)=7 eV 3 (1968Sh03).

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$^{88}\text{Sr}(\text{p,p}'),(\text{pol p,p}) \text{ IAR } \quad \mathbf{1970\text{Co11,1968Co02}} \text{ (continued)}$ ^{89}Y Levels (continued)

E(level) [†]	J ^π [‡]	Γ [#]	E(p)(C.M.) (keV)	Comments
14060 15	3/2 ⁺ @	50 keV	6983 15	E(p)(lab)=6993 (1968Co02,1970Co11), 7000 (1972Bo40,1968Sh03, 1976Ha47), 7010 (1969Wi15), 6987 (1975Ra18). IAR of 1940, 5/2 ⁺ In ^{89}Sr . Γ _p =26 keV 4 Γ=57 keV (1970Co11). Γ _p : from 1973Gr08. Others: 23 keV (1968Co02), 28 keV (1969Wi15), 57 keV (1970Co11). Γ _γ (7000+7070)=7 eV 3 (1968Sh03). E(p)(lab)=7063 (1968Co02,1970Co11,1975Ra18), 7070 (1968Sh03), 7080 (1972Bo40,1976Ha47), 7090 (1969Wi15). IAR of 2008, 3/2 ⁺ In ^{89}Sr .
14369 15	(1/2 ⁻)		7292 15	IAR of 2280, (1/2) ⁻ In ^{89}Sr .
14492 15	3/2 ⁺ @	65 keV 7	7415 15	Γ _p =20 keV 3; Γ _γ =14 eV 5 (1968Sh03) Γ: others: 60 keV (1968Co02), 70 keV (1969Wi15), 68 keV (1970Co11). Γ _p : from 1973Gr08. Others: 18 keV (1968Co02), 22 keV (1969Wi15).
14655 15	(3/2 ⁻)&	30 keV	7578 15	E(p)(lab)=7500 (1968Co02,1970Co11), 7510 (1968Sh03), 7530 (1972Bo40,1969Wi15,1976Ha47). IAR of 2451, 3/2 ⁺ In ^{89}Sr . Γ=20 keV (1973SI01), 26 keV (1970Co11). E(p)(lab)=7660 (1970Co11), 7650 (1973SI01). IAR of 2570, (3/2) ⁻ In ^{89}Sr .
14705? 15		30 keV	7628 15	
14781 15	7/2 ⁺ @	20 keV	7704 15	Γ _p =4 keV Γ=20 keV, Γ _p =4 keV (1969Wi15). E(p)(lab)=7790 (1970Co11), 7800 (1973SI01), 7810 (1969Wi15). IAR of 2675, 7/2 ⁺ In ^{89}Sr .
14833 15		25 keV	7756 15	IAR of 2707, (5/2 ⁻) In ^{89}Sr .
14912 15	(7/2 ⁻)&	30 keV	7835 15	Γ=30 keV (1973SI01,1970Co11). E(p)(lab)=7892 (1968Co02), 7920 (1970Co11,1973SI01). IAR of 2805, (7/2 ⁻ ,5/2 ⁺) In ^{89}Sr .
15006 15	(3/2 ⁺ ,5/2 ⁺)	25 keV	7929 15	E(p)(lab)=8020 (1970Co11). IAR of 2918; 3/2 ⁺ ,5/2 ⁺ In ^{89}Sr .
15176 15	3/2 ⁺ @	55 keV 21	8099 15	Γ _p =6.3 keV 10 Γ=70 keV (1969Wi15), 40 keV (1968Co02), 66 keV (1970Co11). Γ _p =7 keV (1969Wi15), 5.6 keV (1968Co02). E(p)(lab)=8192 (1968Co02,1970Co11), 8210 (1969Wi15). IAR of 3128, 3/2 ⁺ In ^{89}Sr .
15293 15	5/2 ⁺ @	45 keV 7	8216 15	Γ _p =4 keV 3 Γ=40 keV (1969Wi15), 50 keV (1968Co02), 57 keV (1970Co11). Γ _p =1.5 keV (1969Wi15), 3.0 keV (1968Co02). E(p)(lab)=8310 (1968Co02,1969Wi15), 8330 (1970Co11). IAR of 3249, 5/2 ⁺ In ^{89}Sr .
15323 15			8246 15	
15478 15		40 keV	8401 15	Γ _p =2.8 keV E(p)(lab)=8497 (1968Co02,1970Co11).
15787 15	(7/2 ⁻)&	55 keV	8710 15	Γ: from 1973SI01. Other: 15 keV (1970Co11). E(p)(lab)=8810 (1970Co11), 8780 (1973SI01).
15837 15	(1/2 ⁺) ^a	78 keV 15	8760 15	E(p)(lab)=8860 (1970Co11).
16127 15	(1/2 ⁺) ^a	80 keV 15	9050 15	E(p)(lab)=9150 (1970Co11).
16247 15			9170 15	E(p)(lab)=9280 (1970Co11).
16317 15			9240 15	E(p)(lab)=9320-9360 (1970Co11).
16527 15		50 keV 15	9450 15	E(p)(lab)=9560 (1970Co11).
16607 15		50 keV 15	9530 15	E(p)(lab)=9640 (1970Co11).

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$^{88}\text{Sr}(\text{p},\text{p}'),(\text{pol p},\text{p}) \text{ IAR } 1970\text{Co11},1968\text{Co02} \text{ (continued)}$ ^{89}Y Levels (continued)

<u>E(level)[†]</u>	<u>J^π[‡]</u>	<u>Γ[#]</u>	<u>E(p)(C.M.) (keV)</u>	<u>Comments</u>
16647 15		50 keV 15	9570 15	E(p)(lab)=9680 (1970Co11).
16717 15	(5/2 ⁻)&	65 keV 15	9640 15	E(p)(lab)=9750 (1970Co11,1973SI01). Γ=50 keV (1973SI01).
16767 15	(1/2 ⁺)	50 keV 15	9690 15	E(p)(lab)=9800 (1970Co11).
16917 15	(7/2 ⁻)&	40 keV 15	9840 15	E(p)(lab)=9950 (1970Co11), 9900 (1973SI01). Γ=50 keV (1973SI01).
17127 15		50 keV 15	10050 15	E(p)(lab)=10170 (1970Co11).
17427 15		65 keV 15	10350 15	E(p)(lab)=10470 (1970Co11).
17507 15			10430 15	E(p)(lab)=10550 (1970Co11).

[†] From E(p)(C.M.). Values are from 1968Co02 below E(p)=8401 and from 1970Co11 above this energy. S(p)=7077.0 25 (2011AuZZ). The first level is IAR of ^{89}Sr g.s., 5/2⁺.

[‡] From J^π of the parent analog states, unless indicated otherwise. The analog states are confirmed by comparison of Γ_p with the spectroscopic factors of the parent states for $^{88}\text{Sr}(\text{d},\text{p})$ if both values are present.

[#] Γ from 1968Co02 for levels below S(p)+8401 and from 1970Co11 above this energy, unless otherwise stated.

@ From 1969Wi15 based on energy and angular dependence of σ and analyzing power.

& From 1973SI01.

^a From 1970Co11.