

${}^{82}\text{Se}({}^{16}\text{O},\text{p}4\text{n}\gamma)$ 2007Wa45

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 112, 1163 (2011)	15-Dec-2010

2007Wa45: ${}^{82}\text{Se}({}^{16}\text{O},\text{p}4\text{n}\gamma)$, E=100 MeV; 90% ${}^{82}\text{Se}$ enriched target with Au backing; 2 BGO shielded clover Ge detectors, 1 or 2 unshielded clover Ge detectors, 1 LEPS Ge detector, 2 coaxial Ge detectors; measured $E\gamma$, $I\gamma$, γ -t, prompt (140 ns gate Γ) and delayed $\gamma\gamma$ coin, $\gamma(\theta)$ ($\theta=50^\circ$, 76° , 90° , 158°), DCO ratios ($\theta=158^\circ$, 90°), γ linear polarization; deformed independent-particle model calculations. Supersedes 2006WaZX, 2005WaZS, 2004OdZZ, 2004WaZY.

 ${}^{93}\text{Nb}$ Levels

$T_{1/2}(\alpha), E(\alpha)$ interpreted As high-spin shape isomer; population of isomer was 0.4% 2 In this experiment.

E(level) [†]	J π [#]	$T_{1/2}$ [‡]	Comments
0.0	9/2 ⁺		
950.0 10	13/2 ⁺		
1335.0 13	17/2 ⁺		
1491.0 13	15/2 ⁺		
2180.0 15	(17/2 ⁻)		
2311.0 16			
2833.0 16	21/2 ⁺		
3086.0 18	(21/2)		
3668.0 19			
3674.0 20	(25/2)		
3685.0 18			
4105.0 18	25/2 ⁽⁺⁾		
4403.0 23	(29/2)		
4865.0 20	29/2 ⁽⁺⁾		
5155.0 23			
5905.0 23	33/2 ⁽⁺⁾		
7373.0 24	35/2 ⁽⁻⁾		
7436.0 @ 24	37/2 ⁽⁻⁾		
7829 @ 3	39/2 ⁽⁻⁾		
8326 @ 3	41/2 ⁽⁻⁾		
8378.1 25	(37/2)		
8941 @ 3	(43/2 ⁻)		
9135 3	41/2 ⁽⁻⁾		
9426 3	(45/2 ⁺)		
9700 3			
9783? 3			
9923 3	43/2 ⁽⁻⁾		
10956 3			
7436.0+x 24		1.5 μs 5	small population of level (0.4% 2 of total yield of ${}^{93}\text{Nb}$) suggests a non-yrast character (2007Wa45).

[†] From least-squares fit to $E\gamma$, assigning 1 keV uncertainty to all $E\gamma$ data.

[‡] From delayed $\gamma\gamma$ coin.

[#] Authors suggested values, based on transition multipolarities inferred from measured A_2 , DCO ratios and/or linear polarization.

@ Band(A): K=37/2 oblate M1 band? possible M1 band. $\beta=-0.14$ is calculated using independent particle model for the $\nu(d_{5/2})(h_{11/2})\pi(g_{9/2})^3$ configuration suggested by 2007Wa45. No cross-over transitions observed; possibly they are suppressed As a result of the high K.

$^{82}\text{Se}(^{16}\text{O,p4n}\gamma)$ **2007Wa45** (continued)

$\gamma(^{93}\text{Nb})$								
E_γ^\dagger	I_γ^\dagger	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [‡]	$\alpha^{\text{@}}$	Comments
156	2.9 2	1491.0	15/2 ⁺	1335.0	17/2 ⁺			
223	2.1 3	9923	43/2 ⁽⁻⁾	9700				
385	66 2	1335.0	17/2 ⁺	950.0	13/2 ⁺	E2	0.01003	Mult.: $A_2=+0.25$ 6, DCO=1.09 7, $P=+0.062$ 20 (2007Wa45).
393 [#]	6.6 4	7829	39/2 ⁽⁻⁾	7436.0	37/2 ⁽⁻⁾	M1		Mult.: $A_2=-0.24$ 7, DCO=0.38 3, $P=-0.15$ 6 (2007Wa45).
420	5.6 4	4105.0	25/2 ⁽⁺⁾	3685.0		D+Q		Mult.: DCO=1.19 16 (2007Wa45).
485	3.2 3	9426	(45/2 ⁺)	8941	(43/2 ⁻)	E1		Mult.: $A_2=-0.20$ 2, DCO=0.25 9, $P=+0.027$ 17 (2007Wa45).
497 [#]	5.9 4	8326	41/2 ⁽⁻⁾	7829	39/2 ⁽⁻⁾	D		Mult.: $A_2=-0.27$ 4, DCO=0.36 14 (2007Wa45).
522	2.2 3	2833.0	21/2 ⁺	2311.0				
541	9.6 6	1491.0	15/2 ⁺	950.0	13/2 ⁺	M1		Mult.: $A_2=-0.34$ 27, DCO=0.6 2, $P=-0.10$ 6 (2007Wa45).
588	4.1 4	3674.0	(25/2)	3086.0	(21/2)			
615 [#]	5.9 6	8941	(43/2 ⁻)	8326	41/2 ⁽⁻⁾	M1		Mult.: DCO=0.46 6, $P=-0.06$ 3 (2007Wa45).
689	10.5 7	2180.0	(17/2 ⁻)	1491.0	15/2 ⁺	E1		Mult.: $A_2=-0.32$ 23, DCO=0.48 9, $P=+0.08$ 7 (2007Wa45). Note that sign of A_2 is negative (2009Ho07); omission of sign by 2007Wa45 is a typographical error.
729	2.7 4	4403.0	(29/2)	3674.0	(25/2)			Mult.: $A_2=+0.21$ 17.
760	55 5	4865.0	29/2 ⁽⁺⁾	4105.0	25/2 ⁽⁺⁾	E2		Mult.: $A_2=+0.06$ 4, DCO=0.86 4, $P=+0.08$ 4 (2007Wa45).
788	3.0 4	9923	43/2 ⁽⁻⁾	9135	41/2 ⁽⁻⁾	M1		Mult.: DCO=0.52 22, $P=-0.16$ 13 (2007Wa45).
835	2.3 3	3668.0		2833.0	21/2 ⁺			
845	14 1	2180.0	(17/2 ⁻)	1335.0	17/2 ⁺			
852	5.8 4	3685.0		2833.0	21/2 ⁺			
906	10.4 7	3086.0	(21/2)	2180.0	(17/2 ⁻)	Q		Mult.: $A_2=+0.22$ 16, DCO=0.79 17 (2007Wa45).
942	8.3 8	8378.1	(37/2)	7436.0	37/2 ⁽⁻⁾	D+Q		Mult.: $A_2=+0.15$ 8, DCO=0.63 7, $P=+0.033$ 13 (2007Wa45).
950	100 3	950.0	13/2 ⁺	0.0	9/2 ⁺	E2		Mult.: $A_2=+0.13$ 5, DCO=0.86 5, $P=+0.024$ 12 (2007Wa45).
976	1.4 4	2311.0		1335.0	17/2 ⁺			
1005	4.9 5	8378.1	(37/2)	7373.0	35/2 ⁽⁻⁾	D		Mult.: $A_2=-0.27$ 6 (2007Wa45).
1033	3.9 4	10956		9923	43/2 ⁽⁻⁾			Mult.: DCO=0.80 13 (2007Wa45); consistent with Q but does not rule out D+Q.
1040	44 4	5905.0	33/2 ⁽⁺⁾	4865.0	29/2 ⁽⁺⁾	E2		Mult.: DCO=0.90 5, $P=+0.05$ 2 (2007Wa45).
1272	58 3	4105.0	25/2 ⁽⁺⁾	2833.0	21/2 ⁺	Q		Mult.: $A_2=+0.10$ 6, DCO=0.90 6 (2007Wa45).
1405 ^{&}	1.6 2	9783?		8378.1	(37/2)			
1468	6.2 6	7373.0	35/2 ⁽⁻⁾	5905.0	33/2 ⁽⁺⁾	D+Q		Mult.: $A_2=-0.64$ 9, DCO=0.62 12, $P=+0.18$ 12 (2007Wa45).
1481	1.4 4	5155.0		3674.0	(25/2)			
1498	45 3	2833.0	21/2 ⁺	1335.0	17/2 ⁺	E2		Mult.: $A_2=+0.28$ 16, DCO=0.94 5, $P=+0.06$ 2 (2007Wa45).
1531	26 2	7436.0	37/2 ⁽⁻⁾	5905.0	33/2 ⁽⁺⁾	Q		Mult.: $A_2=+0.37$ 4, DCO=0.93 7 (2007Wa45).
1699	4.1 8	9135	41/2 ⁽⁻⁾	7436.0	37/2 ⁽⁻⁾	(E2)		Mult.: DCO=1.3 4, $P=+0.28$ 14 (2007Wa45).
2264	2.0 3	9700		7436.0	37/2 ⁽⁻⁾			

[†] From 2007Wa45. uncertainty In E_γ unstated by authors. Except for the 156 γ , 385 γ , 760 γ , 950 γ , 1040 γ , 1272 γ , 1498 γ and 1531 γ , I_γ was obtained from gated spectra.

[‡] Based on measured A_2 , DCO ratio and/or linear polarization. Expected DCO ratios are 0.88 for $\Delta J=2$ and 0.45 for stretched D transitions when gating on a $\Delta J=2$ transition.

[#] γ emitted within 1.3 ps of formation of parent state (2007Wa45).

Continued on next page (footnotes at end of table)

${}^{82}\text{Se}(16\text{O},\text{p}4\text{n}\gamma)$ [2007Wa45](#) (continued)

$\gamma({}^{93}\text{Nb})$ (continued)

@ Total theoretical internal conversion coefficients, calculated using the BrIcc code ([2008Ki07](#)) with Frozen orbital approximation based on γ -ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

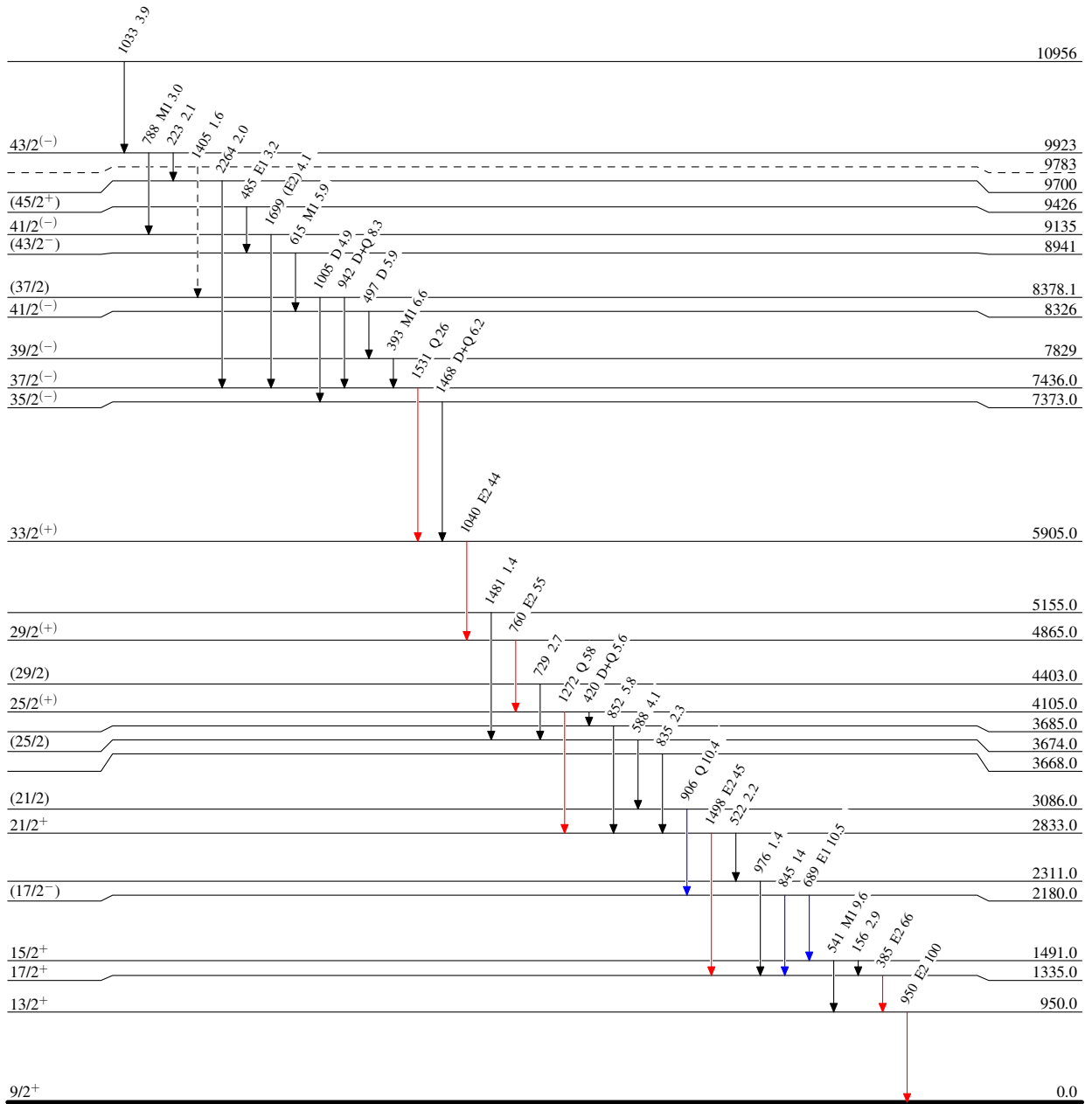
& Placement of transition in the level scheme is uncertain.

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Legend

Level Scheme
Intensities: Relative I_γ

- \longrightarrow $I_\gamma < 2\% \times I_\gamma^{max}$
- \longrightarrow $I_\gamma < 10\% \times I_\gamma^{max}$
- \longrightarrow $I_\gamma > 10\% \times I_\gamma^{max}$
- \dashrightarrow γ Decay (Uncertain)



$^{93}_{41}\text{Nb}_{52}$

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Band(A): K=37/2 oblate
M1 band? possible M1
band

(43/2⁻) 8941

615

41/2⁽⁻⁾ 8326

497

39/2⁽⁻⁾ 7829

393

37/2⁽⁻⁾ 7436.0

${}^{93}_{41}\text{Nb}_{52}$