

$^{51}\text{V}(^{28}\text{Si}, \alpha \text{pn} \gamma)$ 1997Mu23

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen		NDS 158, 1 (2019)	16-May-2019

1997Mu23 (also 1999MuZS): E=125 MeV. Measured $E\gamma$, $I\gamma$, $\gamma\gamma$, and lifetimes by Doppler-shift attenuation method (DSAM) using an array consisting of 12 Compton-suppressed HPGe detectors and a 14 element BGO multiplicity filter.

[Additional information 1.](#)

 ^{73}Se Levels

E(level) [†]	J ^π [‡]	T _{1/2} [#]	Comments
0.0 [@]	9/2 ⁺		T _{1/2} : from Adopted Levels. Additional information 2. E(level): from Adopted Levels.
25.71 ^a 4	3/2 ⁻	39.8 min 17	
151.0 ^b 5	5/2 ⁻		
297.0 ^{&} 8	7/2 ⁺		
505.3 ^a 3	7/2 ⁻		
789.8 ^d 5	(5/2 ⁻)		
804.5 ^b 5	9/2 ⁻		
971.0 [@] 3	13/2 ⁺		
1000.0 ^{&} 7	11/2 ⁺		
1179.4 ^a 4	11/2 ⁻		
1230.1 ^c 4	(9/2 ⁻)		
1354.9 ^d 4	(9/2 ⁻)		
1552.3 ^b 5	13/2 ⁻	1.01 ps +17-16	
1863.0 ^{&} 6	15/2 ⁺		
2002.5 ^a 5	15/2 ⁻	0.82 ps 10	
2009.7 ^c 4	(13/2 ⁻)		
2014.8 [@] 4	17/2 ⁺	0.37 ps +4-5	
2088.1 ^d 4	(13/2 ⁻)		
2432.6 ^b 6	17/2 ⁻	0.48 ps 9	
2868.3 ^c 5	(17/2 ⁻)		
2871.8 ^{&} 5	19/2 ⁺		
2950.3 ^a 6	19/2 ⁻	0.36 ps +5-7	
3002.3 ^d 5	(17/2 ⁻)		
3098.6 9	(19/2 ⁻)		
3171.3 [@] 5	21/2 ⁺	0.18 ps 4	
3440.4 ^b 8	21/2 ⁻	0.312 ps 35	
3834.3 ^c 12	(21/2 ⁻)		
3912.8 ^{&} 6	23/2 ⁺		
4013.4 ^a 9	23/2 ⁻	0.33 ps 4	
4386.4 [@] 6	25/2 ⁺	0.062 ps 14	
4589.4 ^b 10	25/2 ⁻	0.187 ps +28-21	
4944.3 ^c 15	(25/2 ⁻)		
4951.5 ^{&} 7	27/2 ⁺		
5219.4 ^a 11	27/2 ⁻	0.104 ps 14	
5635.9 [@] 7	29/2 ⁺	0.111 ps +21-28	
5853.4 ^b 12	29/2 ⁻	0.083 ps 14	
6525.4 ^a 13	31/2 ⁻	0.132 ps 21	

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$^{51}\text{V}(^{28}\text{Si},\alpha\text{pn}\gamma)$ **1997Mu23** (continued) ^{73}Se Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} [#]	E(level) [†]	J ^π [‡]
7013.9 [@] 12	33/2 ⁺	0.21 ps +3–6	8751.5 ^b 17	37/2 ⁻
7229.4 ^b 14	33/2 ⁻	0.159 ps 28	9531.5 ^a 19	39/2 ⁻
7953.4 ^a 16	35/2 ⁻	0.117 ps +21–28	10214.0 [@] 19	41/2 ⁺
8529.9 [@] 16	37/2 ⁺		10464.5 ^b 20	41/2 ⁻

[†] From least-squares fit to E_γ data, assuming Δ(E_γ)=1 keV for most γ rays, except 0.3 keV for E_γ quoted to tenth of a keV.

[‡] As given in **1997Mu23** based on previous assignments for low-lying low-spin levels, and band structures in their work.

[#] From DSAM (**1999MuZS**), unless otherwise noted.

[@] Band(A): νg_{9/2}, α=+1/2.

[&] Band(a): νg_{9/2}, α=-1/2.

^a Band(B): νp_{3/2} or νf_{5/2}, α=-1/2.

^b Band(b): νp_{3/2} or νf_{5/2}, α=+1/2.

^c Band(C): Band based on (9/2⁻).

^d Band(D): Band based on (5/2⁻).

 $\gamma(^{73}\text{Se})$

E _γ [†]	I _γ [‡]	E _i (level)	J _i ^π	E _f	J _f ^π	Mult.	α [#]	Comments
(25.71 4)		25.71	3/2 ⁻	0.0	9/2 ⁺	E3	5250 90	E _γ , Mult.: from Adopted Gammas.
125	100	151.0	5/2 ⁻	25.71	3/2 ⁻			
297	10	297.0	7/2 ⁺	0.0	9/2 ⁺			
299.5	3	3171.3	21/2 ⁺	2871.8	19/2 ⁺			
300	28	804.5	9/2 ⁻	505.3	7/2 ⁻			
354	68	505.3	7/2 ⁻	151.0	5/2 ⁻			
373	14	1552.3	13/2 ⁻	1179.4	11/2 ⁻			
375	28	1179.4	11/2 ⁻	804.5	9/2 ⁻			
430	6	2432.6	17/2 ⁻	2002.5	15/2 ⁻			
450	10	2002.5	15/2 ⁻	1552.3	13/2 ⁻			
473.5	2	4386.4	25/2 ⁺	3912.8	23/2 ⁺			
479.6	20	505.3	7/2 ⁻	25.71	3/2 ⁻			
490	5	3440.4	21/2 ⁻	2950.3	19/2 ⁻			
518	8	2950.3	19/2 ⁻	2432.6	17/2 ⁻			
565.1	2	1354.9	(9/2 ⁻)	789.8	(5/2 ⁻)			
565.5 ^{&}	2	4951.5	27/2 ⁺	4386.4	25/2 ⁺			
573	5	4013.4	23/2 ⁻	3440.4	21/2 ⁻			
576	3	4589.4	25/2 ⁻	4013.4	23/2 ⁻			
630	3	5219.4	27/2 ⁻	4589.4	25/2 ⁻			
634	3	5853.4	29/2 ⁻	5219.4	27/2 ⁻			
639	3	789.8	(5/2 ⁻)	151.0	5/2 ⁻			
653.5	53	804.5	9/2 ⁻	151.0	5/2 ⁻			
666	2	3098.6	(19/2 ⁻)	2432.6	17/2 ⁻			
672 ^{&}	2	6525.4	31/2 ⁻	5853.4	29/2 ⁻			
674.1	45	1179.4	11/2 ⁻	505.3	7/2 ⁻			
684.7	2	5635.9	29/2 ⁺	4951.5	27/2 ⁺			
703	8	1000.0	11/2 ⁺	297.0	7/2 ⁺			
704 ^{&}	2	7229.4	33/2 ⁻	6525.4	31/2 ⁻			
724.8	6	1230.1	(9/2 ⁻)	505.3	7/2 ⁻			
733.2	2	2088.1	(13/2 ⁻)	1354.9	(9/2 ⁻)			
741.5	3	3912.8	23/2 ⁺	3171.3	21/2 ⁺			

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$^{51}\text{V}(^{28}\text{Si}, \alpha \text{pn} \gamma)$ **1997Mu23** (continued) $\gamma(^{73}\text{Se})$ (continued)

$E_\gamma^\dagger$	$I_\gamma^\ddagger$	$E_i(\text{level})$	J_i^π	E_f	J_f^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	$E_i(\text{level})$	J_i^π	E_f	J_f^π
747.8	44	1552.3	13/2 ⁻	804.5	9/2 ⁻	1041	3	3912.8	23/2 ⁺	2871.8	19/2 ⁺
779.6	5	2009.7	(13/2 ⁻)	1230.1	(9/2 ⁻)	1043.8	37	2014.8	17/2 ⁺	971.0	13/2 ⁺
823.0	27	2002.5	15/2 ⁻	1179.4	11/2 ⁻	1063	13	4013.4	23/2 ⁻	2950.3	19/2 ⁻
830.3	2	2009.7	(13/2 ⁻)	1179.4	11/2 ⁻	1096	4	3098.6	(19/2 ⁻)	2002.5	15/2 ⁻
849.6	1	1354.9	(9/2 ⁻)	505.3	7/2 ⁻	1110	2	4944.3	(25/2 ⁻)	3834.3	(21/2 ⁻)
857	4	2871.8	19/2 ⁺	2014.8	17/2 ⁺	1149	14	4589.4	25/2 ⁻	3440.4	21/2 ⁻
858.6	4	2868.3	(17/2 ⁻)	2009.7	(13/2 ⁻)	1156.5	26	3171.3	21/2 ⁺	2014.8	17/2 ⁺
863	4	1863.0	15/2 ⁺	1000.0	11/2 ⁺	1206	12	5219.4	27/2 ⁻	4013.4	23/2 ⁻
880.4	32	2432.6	17/2 ⁻	1552.3	13/2 ⁻	1215	19	4386.4	25/2 ⁺	3171.3	21/2 ⁺
892	6	1863.0	15/2 ⁺	971.0	13/2 ⁺	1249.2	11	5635.9	29/2 ⁺	4386.4	25/2 ⁺
908.7	2	2088.1	(13/2 ⁻)	1179.4	11/2 ⁻	1264	8	5853.4	29/2 ⁻	4589.4	25/2 ⁻
914.2	2	3002.3	(17/2 ⁻)	2088.1	(13/2 ⁻)	1306	6	6525.4	31/2 ⁻	5219.4	27/2 ⁻
947.8	18	2950.3	19/2 ⁻	2002.5	15/2 ⁻	1376	7	7229.4	33/2 ⁻	5853.4	29/2 ⁻
966	2	3834.3	(21/2 ⁻)	2868.3	(17/2 ⁻)	1378	11	7013.9	33/2 ⁺	5635.9	29/2 ⁺
971.0	70	971.0	13/2 ⁺	0.0	9/2 ⁺	1428	3	7953.4	35/2 ⁻	6525.4	31/2 ⁻
1000@	2@	1000.0	11/2 ⁺	0.0	9/2 ⁺	1516	3	8529.9	37/2 ⁺	7013.9	33/2 ⁺
1000@	1@	3002.3	(17/2 ⁻)	2002.5	15/2 ⁻	1522	3	8751.5	37/2 ⁻	7229.4	33/2 ⁻
1008	18	3440.4	21/2 ⁻	2432.6	17/2 ⁻	1578	3	9531.5	39/2 ⁻	7953.4	35/2 ⁻
1008.8	6	2871.8	19/2 ⁺	1863.0	15/2 ⁺	1684	2	10214.0	41/2 ⁺	8529.9	37/2 ⁺
1039	3	4951.5	27/2 ⁺	3912.8	23/2 ⁺	1713	2	10464.5	41/2 ⁻	8751.5	37/2 ⁻

[†] From **1997Mu23**. Values given in **1999MuZS** are somewhat different; but the authors recommend using the values as in **1997Mu23**.

[‡] From **1999MuZS**.

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

@ Multiply placed with intensity suitably divided.

& Placement of transition in the level scheme is uncertain.

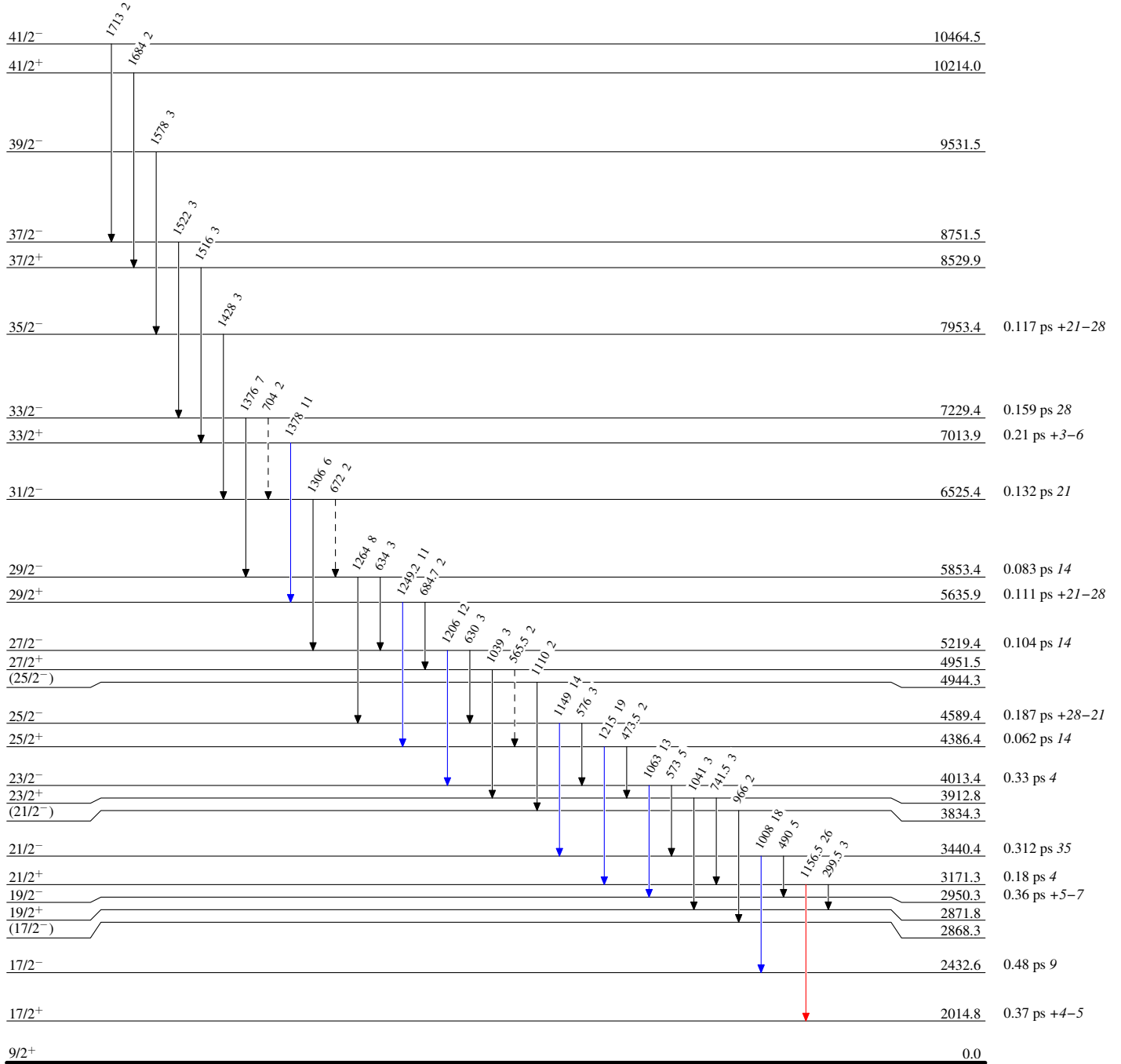
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Legend

Level Scheme

Intensities: Relative I_γ

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



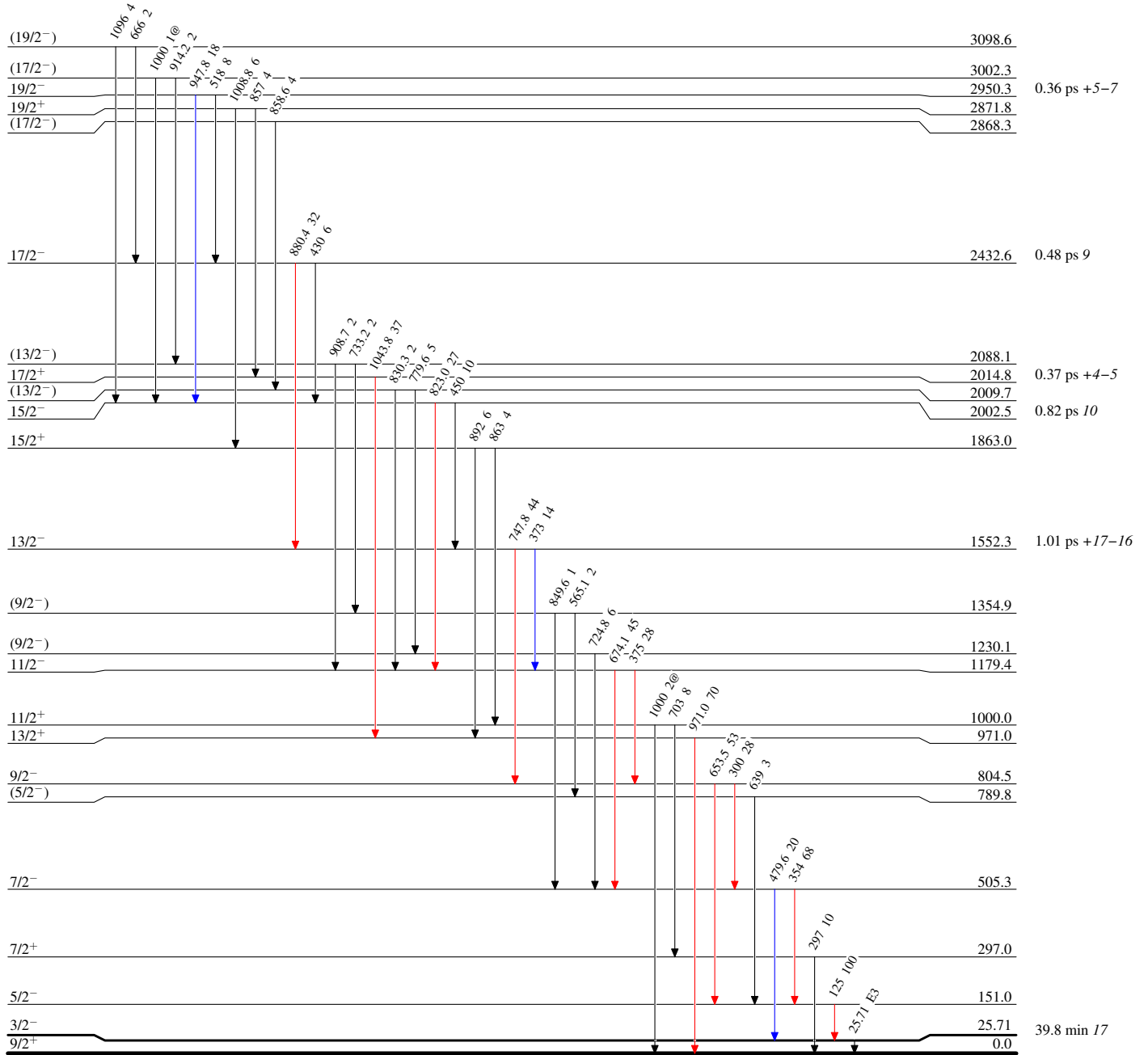
$^{51}\text{V}(^{28}\text{Si}, \alpha \text{pn} \gamma)$ 1997Mu23

Level Scheme (continued)

Intensities: Relative I_γ
 @ Multiply placed: intensity suitably divided

Legend

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

 $^{73}_{34}\text{Se}_{39}$

$^{51}\text{V}(^{28}\text{Si}, \alpha p n \gamma) \quad 1997\text{Mu}23$ 