^{9}Be(^{238}U,Fγ) 2001Mi22,2012Ka36,2015Lo08

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. A. Mccutchan	NDS 152, 331 (2018)	1-Apr-2018

2001Mi22: E(^{238}U)=750 MeV/nucleon. Fission fragments separated with the FRagment Separator (FRS) and identified by TOF, position tracking, and ΔE measurements. Measured Eγ, implant-γ(t) using four HPGe Clover detectors.

2012Ka36: E(^{238}U)=345 MeV/nucleon. Fission fragments separated with the BigRIPS separator followed by the ZeroDegree Spectrometer and identified by ΔE-TOF-Bρ measurements. Measured Eγ, $\gamma\gamma$, implant-γ(t) using 3 HPGe Clover detectors.

2015Lo08: E(^{238}U)=345 MeV/nucleon. Fission fragments separated with the BigRIPS separator followed by the ZeroDegree Spectrometer and identified by ΔE-TOF-Bρ measurements. ^{136}Sb populated in a H-like charge state. Measured Eγ, $\gamma\gamma$, implant-γ(t) using 12 Ge Cluster detectors.

^{136}Sb Levels

E(level)[†]	J$^{\pi}$[‡]	$T_{1/2}$	Comments
0.0	(1$^-$)		
43.4 *3*	(2$^-$)		
215.9 *4*	(4$^-$)		
269.3 *5*	(6$^-$)	539 ns *30*	%IT=100 $T_{1/2}$: weighted average of 489 ns *40* from implant-γ(t) for H-like atom (2015Lo08), 570 ns *40* from implant-γ(t) (2012Ka36) and 570 ns *50* from implant-γ(t) (2001Mi22). All measurements used the 173γ. Uncertainty in 2012Ka36 increased from 5 ns to 40 ns, since the former includes only statistical and not systematic uncertainties, per email communication with first author of 2015Lo08 on Sept. 3, 2015. configuration=$\pi g^{1}_{7/2}\otimes\nu f^{3}_{7/2}$.

[†] From Eγ.
[‡] As proposed in 2015Lo08 based on multipolarities of γ transitions and comparison to shell model calculations.

γ(^{136}Sb)

E$_\gamma$[†]	I$_\gamma$[‡]	E$_i$(level)	J$_i^{\pi}$	E$_f$	J$_f^{\pi}$	Mult.[#]	α[@]	Comments
43.4 *3*	14.3 *29*	43.4	(2$^-$)	0.0	(1$^-$)	(M1)[&]	3.0 *1*	
53.4 *3*	13.9 *23*	269.3	(6$^-$)	215.9	(4$^-$)	(E2)[&a]	3.6 *1*	Eγ: no broadening of the 53γ peak is observed by 2015Lo08, suggesting non-existence of a previously proposed 51.4 *3* transition by 2007Si27.
172.5 *3*	100	215.9	(4$^-$)	43.4	(2$^-$)	(E2)[a]	0.098 *6*	

[†] From 2015Lo08. 2012Ka36 observe a 53.9γ and 173.1γ in coincidence but do not provide placements within the level scheme.
[‡] Deduced by evaluator from the ratios Iγ(43γ)/Iγ(53γ)=1.03 *20* and Iγ(173γ)/Iγ(53γ)=7.2 *12* given in 2015Lo08 and normalizing to Iγ(173γ)=100.
[#] Deduced from intensity ratios in 2015Lo08, see individual comments on the transitions. Note that 2015Lo08 use α values corresponding to neutral atoms. Evaluator has considered α values for H-like Sb atoms using calculations from RAINE (2002Ba85).
[@] From RAINE calculations (2002Ba85) for H-like Sb atoms, values from communication with T. Kibedi on Sept. 7, 2015.
[&] From the intensity ratio Iγ(43γ)/Iγ(53γ)=1.03 *20*, M1 for both the 43.4γ and 53.4γ is excluded. Assuming E2 for the 53.4γ and M1 for the 43.4γ gives a theoretical ratio of Iγ(43γ)/Iγ(53γ)=1.17 *3*, in reasonable agreement with the measured value. A E2+M1 multipolarity for the 53.4γ is also possible, however, excluded when considering the Iγ(173γ)/Iγ(53γ) ratio.
[a] 2015Lo08 note that their intensity ratio of Iγ(173γ)/Iγ(53γ)=7.2 *12* is not consistent with E2 multipolarity for both transitions, which gives a ratio of 13.8 using neutral atom values for α. With the H-like values for α, this ratio drops to 4.2. A multipolarity of M1 or E1 for the 53γ would given an even lower value for the ratio.

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Level Scheme

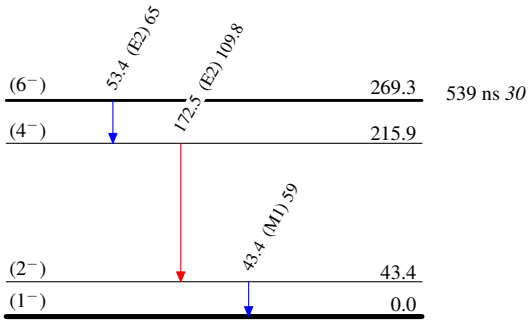
Intensities: Relative $I_{(\gamma+ce)}$

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$



$^{136}_{51}Sb_{85}$