

$^9\text{Be}(^{238}\text{U}, \text{F}\gamma)$ **2019Bi04**

Type	Author	History Citation	Literature Cutoff Date
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2019Bi04: E=6.2 MeV/nucleon ^{238}U beam was produced from at GANIL. Targets were 1.6 μm and 5 μm thick ^9Be . Fragments were identified in atomic weight, atomic number and charge state (A,Z,q) using the VAMOS++ magnetic spectrometer, and detected using multiwire proportional counter (MWPC), two drift chambers, and a segmented ionization chamber. Prompt gamma rays were detected using AGATA γ -ray tracking array, consisting of 32 crystals, placed at 13.5 cm from the target position. The recoiling ions and the γ -ray emission angle were used to obtain the Doppler-corrected prompt γ rays (γ_P), on an event by-event basis. The delayed γ rays (γ_D) were detected by using seven EXOGAM HPGe Clover detectors. Measured E_γ , I_γ , (fragment) γ -coin, $\gamma\gamma$ -coin in terms of three matrices the time range of 100 ns to 200 μs : γ_P - γ_P , γ_D - γ_D , and γ_P - γ_D . Deduced level energies, J^π , isomer half-lives, B(M1)/B(E2) ratios. Comparison with large-scale shell-model calculations.

 ^{123}Sb Levels

E(level) [†]	J^π [‡]	$T_{1/2}$	Comments
0.0	$7/2^+$		
160.0 10	$5/2^+$		
1030.6 10	$9/2^+$		
1088.7 10	$11/2^+$		
1261.1 10	$(9/2^+)$		
1656.7 10	$11/2^-$		
2038.7 14	$(15/2)^-$		
2044.8 13	$(15/2)^+$		
2239.1 17	$(19/2)^-$	222 ns 23	%IT=100 $T_{1/2}$: from (200 γ)(fragment)(t) (2019Bi04), using one-component fit.
2486.4 17	$(19/2)^+$		
2614.6 20	$(23/2)^+$	66 μs 4	%IT=100 $T_{1/2}$: from (128 γ +442 γ +956 γ)(fragment)(t) (2019Bi04), using one-component fit.
3053.8 22	$(25/2^+)^{\#}$		
3297.9 24	$(27/2^+)^{\#}$		

[†] From a least-squares fit to γ -ray energies.

[‡] From Adopted Levels, unless otherwise noted.

[#] Proposed by **2019Bi04** based on decay pattern.

 $\gamma(^{123}\text{Sb})$

E_γ [†]	I_γ [†]	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [#]	$\alpha^@$	Comments
128.2 10	29 16	2614.6	$(23/2^+)$	2486.4	$(19/2)^+$	(E2)	0.684	
159.8 10	63 36	160.0	$5/2^+$	0.0	$7/2^+$			
200.4 10	108 57	2239.1	$(19/2)^-$	2038.7	$(15/2)^-$	E2	0.144	
244.1 [‡] 10	78 16	3297.9	$(27/2^+)$	3053.8	$(25/2^+)$			I_γ : relative to 100 for 439.2 γ from $(25/2^+)$ level.
382.0 10	112 54	2038.7	$(15/2)^-$	1656.7	$11/2^-$			
395.4 10	44 23	1656.7	$11/2^-$	1261.1	$(9/2^+)$			
439.2 [‡] 10	100	3053.8	$(25/2^+)$	2614.6	$(23/2^+)$			I_γ : not relative to 100 for 1089 γ .
441.6 10	32 11	2486.4	$(19/2)^+$	2044.8	$(15/2)^+$			
568.2 10	35 17	1656.7	$11/2^-$	1088.7	$11/2^+$			
626.0 10	125 56	1656.7	$11/2^-$	1030.6	$9/2^+$			
956.0 10	37 14	2044.8	$(15/2)^+$	1088.7	$11/2^+$			
1030.5 10	141 64	1030.6	$9/2^+$	0.0	$7/2^+$			

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$^9\text{Be}(^{238}\text{U}, \text{F}\gamma)$ **2019Bi04** (continued) $\gamma(^{123}\text{Sb})$ (continued)

E_γ [†]	I_γ [†]	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [#]
1089.0 10	100	1088.7	11/2 ⁺	0.0	7/2 ⁺	E2
1101.0 10	44 22	1261.1	(9/2 ⁺)	160.0	5/2 ⁺	

[†] From **2019Bi04**. Intensities are normalized to 100 for the 1089.0 γ from 11/2⁺ level, unless otherwise specified. All the transitions are delayed, except for the two prompt transitions 244.1 and 439.2 above the 23/2⁺ level.

[‡] Prompt transition, identified in **2019Bi04**; not seen in other work.

[#] From Adopted Gammas.

[@] 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.

$^9\text{Be}(^{238}\text{U}, \text{F}\gamma)$ 2019Bi04**Level Scheme**Intensities: Relative I_γ **Legend**

-  $I_\gamma < 2\% \times I_\gamma^{\text{max}}$
 $I_\gamma < 10\% \times I_\gamma^{\text{max}}$
 $I_\gamma > 10\% \times I_\gamma^{\text{max}}$

