

$^9\text{Be}(^{238}\text{U},\text{X}\gamma):\text{isomer}$ 2009A129

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	B. Singh, K. Zuber		ENSDF	12-Apr-2010

2009A129 (also 2009A115): ^{238}U beam at an energy of 1 GeV/nucleon was provided by the SIS-18 accelerator at GSI. The ≈ 2 s spills were separated by ≈ 2 s periods without beam, ^{238}U ions impinging on a target of $2.5\text{g}/\text{cm}^2$ ^9Be + $223\text{mg}/\text{cm}^2$ Nb, the latter for electron stripping of the reaction products. The fragments were identified in flight on an event-by-event basis, while optimizing FRS for transmission of ^{205}Pt ions. Measured delayed γ , $E\gamma$, $I\gamma$, $\gamma\gamma$ coin, (fragments) γ coin, (fragment) β coin, and isomer half-life. Six Double-sided Si detectors (DSSDs) were used for particle detection and RISING array of 15 Euroball cluster Ge detectors for γ rays. Total number of ^{208}Hg implants were ≈ 700 . These implants were correlated with γ , β and Hg K_{α} x rays. Results interpreted with shell-model calculations using OXBASH code including $2d_{5/2}$, $2d_{3/2}$, $3s_{1/2}$, $1h_{11/2}$ proton orbitals below $Z=82$, and $2g_{9/2}$, $1i_{11/2}$, $1j_{15/2}$ neutron orbitals above $N=126$. Comparison of $E(\text{first } 4^+)/E(\text{first } 2^+)$ ratios for even-even nuclei near ^{208}Pb .

 ^{208}Hg Levels

E(level) [†]	$J^{\pi\ddagger}$	$T_{1/2}$	Comments
0.0 [#]	0^+		
669.0 5	(2^+)		Configuration= $\nu g_{9/2}^2$ 2^+ with mixing of $\pi(s_{1/2}d_{3/2})$.
1093.9 [#] 7	(4^+)		
1296.9 [#] 9	(6^+)		
1296.9+x [#]	(8^+)	99 ns 14	$T_{1/2}$: from $\gamma(t)$ gated on 669.0 γ , 424.9 γ and 203.0 γ (2009A129).

[†] From $E\gamma$'s, assuming $\Delta(E\gamma)=0.5$ KeV for each γ ray.

[‡] From shell-model predictions and probable yrast sequence.

[#] Dominant configuration= $\nu g_{9/2}^2$.

 $\gamma(^{208}\text{Hg})$

The 203, 425 and 669 γ rays are in mutual coincidence.

E_{γ}	I_{γ}	$E_i(\text{level})$	J^{π}_i	E_f	J^{π}_f	Mult.	$\alpha^{\dagger}$	Comments
x		1296.9+x	(8^+)	1296.9	(6^+)			E_{γ} : $x < 83.1$ keV (binding energy of the K electron in Hg), as suggested by the observed low intensity of Hg K_{α} x rays. B(E2)(W.u.)=1.9 4–1.58 22 for a transition of $E_{\gamma}=20\text{--}80$ keV as compared to B(E2)(W.u.)=1.22 from shell-model calculations (2009A129). Comparison with similar 8^+ to 6^+ transition in $N=128$, ^{212}Po B(E2)(W.u.)=2.30 gives $(E_{\gamma})^5(1+\text{CC})=3.4 \times 10^{10}$ for isomeric transition in ^{208}Hg , which suggests x closer to 20 keV than 80 keV.
203.0	77 11	1296.9	(6^+)	1093.9	(4^+)	(E2)	0.37	$\alpha(\text{exp})=0.36$ 6 (2009A129) Mult.: from $\alpha(\text{exp})$ deduced from intensity balance consideration, assuming cascade of E2 transitions.
424.9	107 16	1093.9	(4^+)	669.0	(2^+)			
669.0	100 16	669.0	(2^+)	0.0	0^+			

[†] 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.

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Level Scheme

Intensities: Relative I_γ

Legend

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

