^{9}Be(^{48}Ca,^{44}Sγ)   **2010Fo04,2005Gr30,2002So14**

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 190,1 (2023)	20-Jun-2023

2010Fo04: E=60 MeV/nucleon, LISE3 fragment separator at the GANIL facility. The fragments were analyzed by energy loss and magnetic rigidity using a multiwire proportional chamber. The ^{44}S nuclei were implanted in a 125 μm thick kapton foil. A stack of Si detectors was used before the foil to adjust implantation depth and to reconstruct the position of ions. Measured delayed γ and electron spectra using two clover Ge detectors for γ rays and four Si(Li) detectors for electrons. Comparison with shell-model calculations. Two-level mixing model used to extract mixing between the two configurations. Evidence for prolate-spherical shape coexistence. 2011Ca04 conference report is from the same group as 2010Fo04.

Additional information 1.

2005Gr30: Fragmentation of ^{48}Ca beam at 60 MeV/nucleon. The fragments were separated using LISE3 spectrometer at the GANIL facility. The fragments were identified by energy loss and time-of-flight measurements using Si detectors. Measured γ, ce using a Si(Li) detector and two Ge clover detectors. Results are mentioned as preliminary by the authors.

2002So14 (also conference papers from the same group with similar results: 2002Az01, 2002Gu08, 2002Az02, 2000Az03, 2000So17): Fragmentation of a ^{48}Ca beam at 60.3 MeV/nucleon. The fragments were separated using SPEG spectrometer at the GANIL facility. The fragments were identified by energy loss and time-of-flight measurements using Si detectors. Measured (fragment)γ, $\gamma\gamma$ using three segmented Ge clover detectors and 74 BaF$_2$ detectors.

Many authors in 2005Gr30 and 2002So14 are common.

2004Gr20, 2003Gr22: Fragmentation of ^{48}Ca beam at 60 MeV/nucleon. The fragments were separated using the LISE3 spectrometer at the GANIL facility. The fragments were identified by energy loss and time-of-flight measurements using Si detectors. Measured γ, ce using a Si(Li) detector and two Ge clover detectors.

The results in 2005Gr30 are stated in the paper as preliminary.

^{44}S Levels

E(level)[†]	J$^{\pi}$[#]	T$_{1/2}$	Comments
0.0	0$^+$	100 ms 1	T$_{1/2}$: from 2004Gr20 and 2003Gr22. T$_{1/2}$=117 ms 6 in the Adopted Levels.
1329.0 5	2$^+$		
1365 1	0$^+$	2.619 μs 26	Values of B(E2) from 1329,2$^+$ to 1365 level and ρ^2 for E0 transition are the lowest in this mass region which suggests weak mixing between the g.s. and the 0$^+$ isomer and shape coexistence. Comparison with full $sd(fp)$ shell-model calculations shows consistency with the experimental data.
			T$_{1/2}$: from time distribution of 1362.5 electron peak (2010Fo04). Other: 2.3 μs 3 from ce(t) (2005Gr30).
1617[‡] 7			J$^{\pi}$: 2002So14 proposed (0$^+$) tentatively, but excited 0$^+$ at 1365 keV is reported by 2005Gr30. Only one excited 0$^+$ is predicted by shell-model calculations in this energy region which most likely corresponds to 1365 level.
2632[‡] 11	(2$^+$)		

[†] From a least-squares fit to γ-ray energies.
[‡] Level from 2002So14 only.
[#] From the Adopted Levels, unless otherwise stated.

γ(^{44}S)

E$_{\gamma}$[‡]	E$_i$(level)	J$_i^{\pi}$	E$_f$	J$_f^{\pi}$	Mult.	α[†]	I$_{(\gamma+ce)}$[&]	Comments
(36 1)	1365	0$^+$	1329.0	2$^+$	[E2]	9.7 11	56×10^3 3	B(E2)↓=0.00084 26 (2010Fo04)
								ce(K)/(γ+ce)=0.83 4; ce(L)/(γ+ce)=0.070 11; ce(M)/(γ+ce)=0.0057 9
								α(K)=8.9 10; α(L)=0.75 9; α(M)=0.060 7
								E$_{\gamma}$: from 2010Fo04, below the threshold of γ spectrum.
								α: 2010Fo04 use a value of 10.94 1 which is extrapolated

Continued on next page (footnotes at end of table)

^{9}Be(^{48}Ca,^{44}Sγ)   **2010Fo04,2005Gr30,2002So14 (continued)**

γ(^{44}S) (continued)

E_γ[‡]	I_γ[@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[†]	$I_{(\gamma+ce)}$[&]	Comments
									from values in 1976Ba63, which are superseded by values calculated using the BrIcc program (2008Ki07).
									$I_{(\gamma+ce)}$: obtained from number of delayed 1329-keV γ rays, after correction for 1332.5 ^{60}Co contaminant line.
288[#] *7*	80	1617		1329.0	2$^+$				
988[#] *15*	50	2632	(2$^+$)	1617					This γ was not used in the least-squares fit procedure, as the fit is poor with level-energy difference=1015 *13* as compared to Eγ=988 *15*, differing by about 2σ.
1329.0 *5*	100	1329.0	2$^+$	0.0	0$^+$	[E2]	6.09×10^{-5} *9*		α(K)=2.289×10^{-5} *32*; α(L)=1.766×10^{-6} *25*; α(M)=1.489×10^{-7} *21* α(IPF)=3.61×10^{-5} *5* Eγ: from 2010Fo04, contaminated by 1332.5 keV peak from ^{60}Co decay. Others: 1350 *10* (2002So14), 1329 (2005Gr30).
1365 *1*		1365	0$^+$	0.0	0$^+$	E0		347×10^3 *19*	Eγ: 1362.5 *10* electron line from conversion electron spectrum (2005Gr30), transition not seen in γ-ray experiment. This transition, in addition to E0, also decays by internal pair formation indicated by the observation of time spectra measured in coincidence with 511 annihilation radiation.
									$I_{(\gamma+ce)}$: I(E0)(total) is deduced from I(ce)=148×10^3 *8* and I(E0)(total)=I(ce)×[1+Σ_{IPF}/Σ_{ce}], where σ_{IPF}=1.495×10^7 s$^-$ and Σ_{ce}=1.1125×10^7 s$^-$ are the decay rates of the E0 transition through the internal pair formation and internal conversion, respectively (2010Fo04). Monopole strength ρ^2(E0)=0.0087 *7* (2010Fo04).
2632 *11*	100	2632	(2$^+$)	0.0	0$^+$				

[†] Additional information 2.
[‡] From 2010Fo04, unless otherwise noted.
[#] From 2002So14 only.
[@] From 2002So14, normalized to 100 for 1329γ.
[&] From 2010Fo04.

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<u>Level Scheme</u>

Intensities: Relative I_γ

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

(2$^+$)   2632

0$^+$ 1617
0$^+$ 1365   2.619 μs 26
2$^+$ 1329.0

0$^+$ 0.0   100 ms 1

$^{44}_{16}S_{28}$