^{235}U(n,Fγ),^{241}Pu(n,Fγ) 2012Mu08,2017An15

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 172,1 (2021)	31-Jan-2021

2012Mu08: ^{235}U(n,Fγ), E=thermal neutrons from the Canada India Research Utility Services (CIRUS) reactor facility, Bhabha Atomic Research Center (BARC), Mumbai. Target≈5.1 gm/cm^3 UAl_3 (17% enriched ^{235}U). Gamma rays were detected in coincidence mode by two clover HPGe detectors with anti-Compton shields. Measured Eγ, Iγ, $\gamma\gamma$-coin. Deduced levels, J, π, isotopic yield, angular momentum distribution.

2017An15: ^{235}U,^{241}Pu(n,Fγ), prompt-fission spectroscopy using incident neutrons from the PF1B cold neutron beam at the Institut Laue-Langevin (ILL), Grenoble. Measured Eγ, $\gamma\gamma$-coin, lifetimes of the first 2^+, 4^+ and 6^+ levels by fast-timing technique using the EXILL-FATIMA array consisting of eight EXOGAM clovers and 16 $LaBr_3$(Ce) scintillators. The $\gamma\gamma$ coincidences between one clover and two $LaBr_3$(Ce) detectors were required within a 120-ns time window. The analysis of fast-timing coincidence events involved method of mirror symmetric centroid difference (MSCD), extended to the generalized centroid difference method (GCDM). Deduced B(E2) and compared with Interacting Boson model and Monte-Carlo shell-model calculations. See also 2014Re16 for methodology of fast timing $\gamma\gamma$(t) technique. See also the conference paper 2015ReZZ.

Others:

1973Kh05: ^{235}U(n,Fγ). 1973Kh05 measure energies and intensities of three γ rays in the g.s. band, conversion electrons.

1974Su04: ^{235}U(n,Fγ); ^{239}Pu(n,Fγ).

1987BoZN: measured Eγ, Iγ.

Additional information 1.

^{100}Zr Levels

E(level)	J^{π} †	$T_{1/2}$ ‡	Comments
0#	0^+		
213#	2^+	582 ps *12*	$T_{1/2}$: mean lifetime τ=840 ps *18* from τ=830 ps *30* in ^{241}Pu(n,Fγ), and 850 ps *20* in ^{235}U(n,Fγ) (2017An15). Other: $T_{1/2}$=573 ps *50* (2013RuZX, $\gamma\gamma$(t), also measurement at ILL-Grenoble, probably using the same experimental setup as in 2017An15).
564#	4^+	25.6 ps *28*	$T_{1/2}$: mean lifetime τ=37 ps *4* from ^{235}U(n,Fγ) (2017An15). Other: τ=25 ps *10* from ^{241}Pu(n,Fγ), where the lifetime is affected by a contaminant γ line in the complementary fission partner (2017An15).
1062#	6^+	8.3 ps *35*	$T_{1/2}$: mean lifetime τ=12 ps *5* from ^{235}U(n,Fγ) (2017An15).
1687#	8^+		
2426#	10^+		

† From 2012Mu08.

‡ From fast-timing $\gamma\gamma$-coin technique, and analysis by generalized centroid difference method (GCDM) (2017An15).

\# Band(A): g.s. band.

γ(^{100}Zr)

E_{γ} †	I_{γ} †	E_i(level)	J^{π}_i	E_f	J^{π}_f	Mult.	Comments
212	>100	213	2^+	0	0^+	(E2)	I_{γ}: other: I(212γ)/I(352γ)=37(13)/56(28) (1973Kh05). Mult.: suggested by K/L ratio of measured conversion electrons in 1973Kh05.
352	100	564	4^+	213	2^+		
498	62	1062	6^+	564	4^+		I_{γ}: other: I(498γ)/I(352γ)=55(18)/56(28) (1973Kh05).
625	17	1687	8^+	1062	6^+		I_{γ}: other: I(625γ)/I(352γ)=50(25)/56(28) (1973Kh05).
739	9.6	2426	10^+	1687	8^+		

† From 2012Mu08, unless otherwise noted. Intensity uncertainties of 5% to 25% are stated in 2012Mu08, depending on γ-ray intensity.

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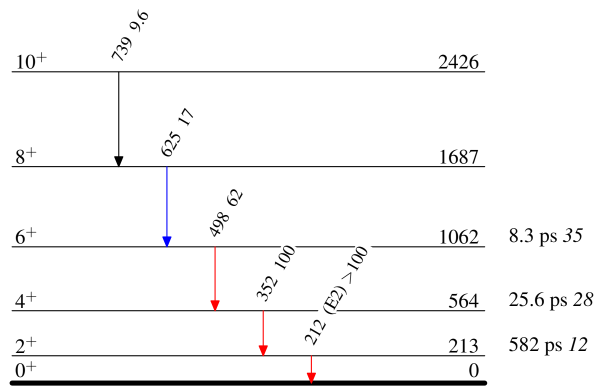
Level Scheme

Intensities: Relative I_γ

Legend

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



$^{100}_{40}Zr_{60}$

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