

### 1 Half-life, Q-value and Decay mode

$T_{1/2}$  : 2.102 (5) d  
 $Q_{\beta^-}$  : 1291.5 (4) keV  
 $\beta^-$  : 100 %

### 2 $\beta^-$ Transitions

	Energy keV	Probability $\times 100$	Nature	log <i>ft</i>
$\beta_{0,15}^-$	89.0 (4)	0.51 (6)	1st forbidden	6.57
$\beta_{0,13}^-$	221.6 (4)	11.50 (7)	Allowed	6.44
$\beta_{0,12}^-$	263.0 (4)	44.75 (19)	Allowed	6.09
$\beta_{0,11}^-$	306.0 (4)	0.49 (1)	1st forbidden	8.25
$\beta_{0,10}^-$	308.4 (4)	0.27 (3)	Allowed	8.51
$\beta_{0,9}^-$	323.3 (6)	0.082 (6)	1st forbidden	9.11
$\beta_{0,8}^-$	328.7 (4)	1.25 (1)	1st forbidden	7.95
$\beta_{0,5}^-$	630.1 (4)	0.036 (3)	1st forbidden	10.44
$\beta_{0,4}^-$	686.4 (4)	0.103 (3)	1st forbidden	10.08
$\beta_{0,1}^-$	1247.4 (4)	41.0 (25)	Allowed	8.38

### 3 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
eAL	(Pu)	6.19 - 22.99	29.7 (14)	
eAK	(Pu)		0.021 (8)	
	KLL	75.26 - 85.36	}	
	KLX	92.607 - 103.729	}	
	KXY	109.93 - 121.78	}	
ec <sub>1,0</sub> L	(Pu)	20.97 - 26.01	58.6 (17)	
ec <sub>1,0</sub> M	(Pu)	38.14 - 40.30	16.4 (5)	
ec <sub>2,1</sub> L	(Pu)	78.78 - 83.82	2.65 (10)	
ec <sub>14,9</sub> L	(Pu)	91.3 - 96.3	0.036 (6)	
ec <sub>2,1</sub> M	(Pu)	95.95 - 98.10	0.74 (3)	
ec <sub>15,14</sub> L	(Pu)	97.01 - 102.05	0.28 (6)	
ec <sub>14,9</sub> M	(Pu)	108.5 - 110.6	0.0100 (19)	
ec <sub>15,14</sub> M	(Pu)	114.18 - 116.34	0.070 (7)	
ec <sub>13,2</sub> K	(Pu)	802.20 (2)	0.0258 (11)	
ec <sub>10,1</sub> K	(Pu)	817.1 (1)	0.114 (16)	
ec <sub>12,1</sub> K	(Pu)	862.66 (2)	0.242 (8)	
ec <sub>13,1</sub> K	(Pu)	904.08 (2)	0.080 (4)	
ec <sub>12,0</sub> K	(Pu)	906.75 (2)	0.160 (3)	
ec <sub>10,1</sub> L	(Pu)	915.84 - 920.88	0.022 (3)	
ec <sub>12,1</sub> L	(Pu)	961.35 - 966.39	0.055 (3)	
ec <sub>12,1</sub> M	(Pu)	978.52 - 980.68	0.015 (3)	
ec <sub>13,1</sub> L	(Pu)	1002.77 - 1007.81	0.0184 (9)	

		Energy keV		Electrons per 100 disint.	Energy keV
ec <sub>12,0</sub> L	(Pu)	1005.44 - 1010.48		0.0405 (10)	
ec <sub>12,0</sub> M	(Pu)	1022.61 - 1024.76		0.0101 (2)	
$\beta_{0,15}^-$	max:	89.0	(4)	0.51 (6)	avg: 23.0 (2)
$\beta_{0,13}^-$	max:	221.6	(4)	11.50 (7)	avg: 59.9 (2)
$\beta_{0,12}^-$	max:	263.0	(4)	44.75 (19)	avg: 72.0 (2)
$\beta_{0,11}^-$	max:	306.0	(4)	0.49 (1)	avg: 84.9 (2)
$\beta_{0,10}^-$	max:	308.4	(4)	0.27 (3)	avg: 85.6 (2)
$\beta_{0,9}^-$	max:	323.3	(6)	0.082 (6)	avg: 90.1 (2)
$\beta_{0,8}^-$	max:	328.7	(4)	1.25 (1)	avg: 91.8 (2)
$\beta_{0,5}^-$	max:	630.1	(4)	0.036 (3)	avg: 189.2 (2)
$\beta_{0,4}^-$	max:	686.4	(4)	0.103 (3)	avg: 208.4 (2)
$\beta_{0,1}^-$	max:	1247.4	(4)	41.0 (25)	avg: 412.2 (2)

## 4 Photon Emissions

### 4.1 X-Ray Emissions

		Energy keV	Photons per 100 disint.	
XL	(Pu)	12.125 — 21.984	32.4 (14)	
XK $\alpha_2$	(Pu)	99.525	0.210 (8)	} K $\alpha$
XK $\alpha_1$	(Pu)	103.734	0.332 (12)	}
XK $\beta_3$	(Pu)	116.244	}	
XK $\beta_1$	(Pu)	117.228	} 0.122 (5)	K $\beta'_1$
XK $\beta'_5$	(Pu)	117.918	}	
XK $\beta_2$	(Pu)	120.54	}	
XK $\beta_4$	(Pu)	120.969	} 0.042 (2)	K $\beta'_2$
XKO <sub>2,3</sub>	(Pu)	121.543	}	

### 4.2 Gamma Transitions and Emissions

	Energy keV	P <sub><math>\gamma+ce</math></sub> × 100	Multipolarity	$\alpha_T$	P <sub><math>\gamma</math></sub> × 100
$\gamma_{1,0}$ (Pu)	44.07 (2)	80.7 (23)	E2	788 (16)	0.1024 (21)
$\gamma_{2,1}$ (Pu)	101.88 (2)	3.90 (14)	E2	14.5 (3)	0.252 (8)
$\gamma_{-1,1}$ (Pu)	103.74 (2)	0.312 (3)			0.312 (3)
$\gamma_{14,9}$ (Pu)	114.4 (4)	0.055 (10)	[E2]	8.47 (17)	0.0058 (10)
$\gamma_{-1,2}$ (Pu)	116.27 (8)	0.04			0.04
$\gamma_{-1,3}$ (Pu)	117.27 (8)	0.074			0.074
$\gamma_{15,14}$ (Pu)	120.11 (5)	0.48 (6)	M1(+E2)	3.8 (6)	0.101 (5)
$\gamma_{-1,4}$ (Pu)	120.5	0.02			0.02
$\gamma_{-1,5}$ (Pu)	121.70 (8)	0.010 (1)			0.010 (1)

	Energy keV	$P_{\gamma+ce}$ $\times 100$	Multipolarity	$\alpha_T$	$P_\gamma$ $\times 100$
$\gamma_{15,13}(\text{Pu})$	132.5 (1)	0.0018 (10)	[E1]	0.267 (5)	0.0014 (8)
$\gamma_{3,2}(\text{Pu})$	157.42 (5)	0.003	[E2]	2.19 (4)	0.001
$\gamma_{15,12}(\text{Pu})$	174.08 (5)	0.0261 (9)	[E1]	0.142 (3)	0.0229 (8)
$\gamma_{-1,6}(\text{Pu})$	220.87 (11)	0.037 (9)	(M2)	11.4 (20)	0.0030 (5)
$\gamma_{8,5}(\text{Pu})$	301.37 (7)	0.0128 (12)	E2	0.208 (4)	0.0106 (10)
$\gamma_{14,6}(\text{Pu})$	319.29 (11)	0.013 (3)	M1+E2	0.59 (25)	0.0083 (10)
$\gamma_{10,5}(\text{Pu})$	321.75 (20)	0.0013			0.0013 (8)
$\gamma_{11,5}(\text{Pu})$	324.02 (9)	0.0184 (14)	M1+E2	0.26 (7)	0.0146 (8)
$\gamma_{7,4}(\text{Pu})$	336.36 (15)	0.00020 (13)	[E1]	0.0324 (7)	0.0002 (1)
$\gamma_{8,4}(\text{Pu})$	357.64 (7)	0.0612 (17)	M1+E2	0.214 (16)	0.0504 (13)
$\gamma_{10,4}(\text{Pu})$	378.05 (13)	0.003			0.0030 (5)
$\gamma_{11,4}(\text{Pu})$	380.31 (10)	0.0180 (8)	[M1]	0.623 (9)	0.0111 (5)
$\gamma_{14,5}(\text{Pu})$	421.1 (1)	0.0309 (15)	[M1]	0.472 (7)	0.021 (1)
$\gamma_{6,3}(\text{Pu})$	459.8 (2)	0.0023			0.0023 (15)
$\gamma_{5,2}(\text{Pu})$	515.51 (7)	0.0386 (11)	E1+M2	0.022 (4)	0.0378 (11)
$\gamma_{4,1}(\text{Pu})$	561.14 (5)	0.1072 (15)	E1	0.0115 (2)	0.106 (2)
$\gamma_{4,0}(\text{Pu})$	605.16 (5)	0.078 (2)	E1	0.0100 (2)	0.077 (2)
$\gamma_{5,1}(\text{Pu})$	617.39 (5)	0.0604 (7)	E1+M2	0.0120 (14)	0.0593
$\gamma_{6,2}(\text{Pu})$	617.4	0.008 (0)			0.008
$\gamma_{10,2}(\text{Pu})$	836.96 (7)	0.0210 (8)	[E2]	0.0174 (4)	0.0206 (8)
$\gamma_{12,2}(\text{Pu})$	882.63 (3)	0.816 (9)	(E2)	0.0157 (3)	0.803 (9)
$\gamma_{-1,7}(\text{Pu})$	885	0.040 (5)			0.040 (5)
$\gamma_{7,1}(\text{Pu})$	897.34 (10)	0.0074 (10)	(E2)	0.0152 (3)	0.0073 (10)
$\gamma_{8,1}(\text{Pu})$	918.70 (4)	0.531 (6)	E1	0.0047 (1)	0.529 (6)
$\gamma_{13,2}(\text{Pu})$	923.99 (2)	2.64 (2)	(M1+E2)	0.014 (1)	2.604 (20)
$\gamma_{9,1}(\text{Pu})$	924	0.065			0.065
$\gamma_{14,2}(\text{Pu})$	936.60 (5)	0.369 (5)	[E1+M2]	0.0112 (22)	0.365 (5)
$\gamma_{10,1}(\text{Pu})$	938.94 (10)	0.18 (2)	E0+E2	4.4 (4)	0.0327 (25)
$\gamma_{11,1}(\text{Pu})$	941.40 (4)	0.504	[E1+M2]		0.504 (6)
$\gamma_{8,0}(\text{Pu})$	962.76 (2)	0.648 (8)	E1	0.00433 (9)	0.645 (8)
$\gamma_{9,0}(\text{Pu})$	968.9 (4)	0.017 (6)	[M2]	0.116 (3)	0.015 (8)
$\gamma_{10,0}(\text{Pu})$	983.0 (3)	0.07 (2)	[E2]	0.0128 (3)	0.068 (20)
$\gamma_{12,1}(\text{Pu})$	984.45 (2)	25.50 (13)	M1+E2	0.0125 (5)	25.18 (13)
$\gamma_{13,1}(\text{Pu})$	1025.87 (2)	8.86 (7)	M1+E2	0.0120 (5)	8.76 (6)
$\gamma_{12,0}(\text{Pu})$	1028.54 (2)	18.46 (13)	E2	0.0117 (2)	18.25 (13)

## 5 References

- M.S.FREEDMAN, A.H.JAFFEY, F.WAGNER JR., Phys. Rev. 79 (1950) 410  
(Half-life)
- D.C.DUNLAVEY, G.T.SEABORG, Phys. Rev. 87 (1952) 165  
(Conversion electron measurements, gamma-ray multiplicities)
- S.A.BARANOV, K.N.SHLYAGIN, At. Energ. 1 (1956) 52  
(Conversion electron measurements, gamma-ray multiplicities)
- W.G.SMITH, J.M.HOLLANDER, Phys. Rev. 101 (1956) 746  
(Conversion electron measurements, gamma-ray multiplicities)
- R.G.ALBRIDGE, J.C.HUBBS, R.MARRUS, Phys. Rev. 111 (1958) 1137  
(Half-life)
- F.ASARO, I.PERLMAN, Report UCRL-9566, Univ. California (1960) 50  
(Conversion electron measurements, gamma-ray multiplicities)

- R.G.ALBRIDGE, J.M.HOLLANDER, Nucl. Phys. 21 (1960) 438  
 (Conversion electron measurements, gamma-ray multipolarities)
- G.G.AKALAEV, N.A.VARTANOV, P.S.SAMOILOV, Report NP-14688 (1965)  
 (Conversion electron measurements, gamma-ray multipolarities)
- S.M.QAIM, Nucl. Phys. 84 (1966) 411  
 (Half-life)
- B.BENGTSON, J.JENSEN, M.MOSZYNSKI, H.L.NIELSEN, Nucl. Phys. A159 (1970) 249  
 (924-keV gamma-ray energy and relative emission probability)
- W.J.B.WINTER, A.H.WAPSTRA, P.F.A.GOUDSMIT, J.KONIJN, Nucl. Phys. A197 (1972) 417  
 (Relative gamma-ray intensities)
- C.M.LEDERER, Priv. Comm. (1970), cited in C.M.Lederer et al., Table of Isotopes, 7th Ed., John Wiley and Sons Inc., N.Y. (1978)  
 (Gamma-ray energy)
- C.M.LEDERER, Phys. Rev. C24 (1981) 1175  
 (Relative gamma-ray intensities)
- Y.CHANG, B.ZHU, C.YAN, G.SHI, J.CHIN, Chin. J. Nucl. Phys. 12 (1990) 65  
 (Relative gamma-ray intensities, absolute 984-keV gamma-ray emission probability)
- E.SCHÖNFELD, H.JANSSEN, Nucl. Instrum. Methods Phys. Res. A369 (1996) 527  
 (Atomic data)
- E.SCHÖNFELD, G.RODLOFF, Report PTB-6.11-1999-1, Braunschweig (1999)  
 (KX-rays relative emission probabilities)
- F.E.CHUKREEV, V.E.MAKARENKO, M.J.MARTIN, Nucl. Data Sheets 97 (2002) 129  
 (Nuclear data evaluation for A=238)
- G.AUDI, A.H.WAPSTRA, C.THIBAUT, Nucl. Phys. A729 (2003) 337  
 (Q)
- K.RENGAN, D.DEVRIES, H.GRIFFIN, Nucl. Instrum. Methods Phys. Res. A565 (2006) 612  
 (Gamma-ray energies, relative gamma-ray intensities, absolute 984-keV gamma-ray emission probability)