^{133m}Xe- Comments on evaluation of decay data
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1) Decay Scheme

^{133m}Xe decays by a single highly converted γ-transition to the ground state of ^{133}Xe.

2) Nuclear Data

The 233-keV isomeric state has $J_\pi = 11/2^-$ (1989RA17).

The measured ^{133m}Xe half-life values, are:

Reference	Value (days)
1975HO18	2.19 (5)
1974FOZY	2.188 (8)
1968AL16	2.191 (29)
1961ER04	2.26 (2)
1951BE11	2.30 (8)
No. inputs	5

Statistical method	Weighted Mean	Uncertainty	Reduced χ^2
LWEIGHT	2.198	0.007 internal	3.22
		0.013external	
NRM	2.200	0.011	1.68
RT	2.191	0.007	0.98
Bootstrap	2.214	0.037	4.47
Mandel-Paule	2.214	0.029	4.42

The AveTool program has been used with these five input values. This program calculates averages using five statistical methods: LWM (Limitation of Relative Statistical Weight), NRM (Normalised Residual Method), RT (Rajeval Technique), Bootstrap Method and Mandel-Paule Approximation. As can be seen in the upper table, the different statistical methods agree within 1σ.
The adopted and therefore the recommended value for the ^{133m}Xe half-life is the LWEIGHT method weighted mean with its associated external uncertainty:

Recommended ^{133m}Xe half-life: 2.198 (13) d.

The adopted half-life for ^{133}Xe of 5.2441 (37) d has been taken from the new DDEP evaluation of 2017.

2.1) Gamma-ray Transitions

The evaluated γ-ray transition energy and thus the isomeric level energy is the photon energy plus the nuclear recoil energy.

The 233-keV γ-ray has an M4+E5 multipolarity as has been reported by different authors. The various theoretical conversion coefficients for this transition (Band *et al.*, Häger and Seltzer, Rosel *et al.*) differ by about 2% from each other. The adopted ICCs (α_T, α_K, α_L) have been interpolated from the new Band *et al.* tables (2002BA85) using the BrIcc Computer Code (2008KI07) and are shown below.

α_T	α_K	α_L	α_{L1}	α_{L2}	α_{L3}	α_M	α_N	α_O
8.88 (14)	6.22 (10)	2.08 (7)	1.162 (19)	0.29 (5)	0.633 (24)	0.464 (16)	0.095 (3)	0.0106 (3)

Some α_T, α_K and shell ratio experimental values have been reported in the literature. These values, together with the theoretical ones, are shown in the table below:

Reference	α_K exp.	α_K th.	K/L+
1952BE55	4.4 (14)		2.32 (15)
1968AL16	7.68 (25)		2.04 (12)
1968HA52		6.37 (9)	2.51 (5)
1972AC02	7.4 (14)		2.54 (20)
1978RO22		6.35 (9)	2.44 (4)
2002BA85		6.22 (9)	2.44 (3)

The mixing ratio has been calculated using BrIccMixing from experimental K/L+ ratios reported in 1951BE11, 1952BE55, 1968AL16 and 1972AC02, with the subshell ratios derived from data reported in 1969FR04 (L1:L2:L3 = 100 (3) : 25.0 (12) : 52.6 (16)) – see table below. The value obtained was δ = 0.10 (5) in very good agreement with the calculated value of δ = 0.10 (8) in 2006RA03.

Ref.	Shell	Ratio (unc)
1951BE11	K/L	2.90 (20)
1952BE55	K/LMN	2.32 (15)
1968AL16	K/LMN	2.04 (12)
1972AC02	K/LMN	2.54 (20)
1969Fr04	L1/L2	4.0 (2)
1969Fr04	L1/L3	1.90 (6)

3) Atomic Data

Atomic values (ω_k, ϖ_L and η_{KL}) are from 1996SC06 and are shown below.

ω_K	0.888 ± 0.005
ϖ_L	0.097 ± 0.005
η_{KL}	0.902 ± 0.004

The X-ray and Auger electron emission probabilities have been calculated from γ-ray and conversion electron data using the two available programs RADLIST and EMISSION. The results given from these two codes are compatible (< 0.1%) and are also in good agreement with the intensities reported in 2012RI04.

4) Radiation emissions

4.1) Conversion electrons

The conversion electron emission probabilities have been deduced from the ICC values and from the γ-ray emission probability.

The total conversion electron emission probability has been deduced from:

$P_{ce} = 100 - P_\gamma = 100 – 10.12\ (14) = 89.88\ (14)$

4.2) γ-Ray Emissions

Various measurements of the γ-ray energy have been found in the literature:

Reference	Value (keV)
1976ME16	233.221 (15)
1972AC02	233.2 (4)
1952BE55	232.8 (3)
1951BE11	232.8 (4)

Statistical method	Weighted Mean	Uncertainty	Reduced χ^2
LWEIGHT	233.219	0.015 internal 0.015 external	1.02
NRM	233.219	0.015	1.02
RT	233.11	0.12	0.76
Bootstrap	233.00	0.016	69.96
Mandel-Paule	233.213	0.029	1.07

The recommended value is the weighted mean from the LWEIGHT statistical method and its external uncertainty: $E_\gamma = 233.219\ (15)$ keV.

The γ-ray emission intensity is given by:

$P\gamma = 100 / (1 + \alpha_T) = 100 / [1 + 8.88\ (14)] = 10.12\ (14)$ %.

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