

(HI,xn $\gamma$ ) 1996Ta18,2002Do19

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	F. G. Kondev	NDS 192,1 (2023)	1-Aug-2023

**1996Ta18:** produced using  $^{176}\text{Hf}(^{28}\text{Si},4n\gamma)$ ,  $E(^{28}\text{Si})=142$  MeV; Target: self-supporting, carbon-backed target made of hafnium oxide with thickness of  $40 \mu\text{g}/\text{cm}^2$  and enriched  $>70\%$  in  $^{176}\text{Hf}$ ; Detectors: fragment mass analyzer; gas-filled parallel-plate avalanche counter and double-sided silicon strip detector at the focal plane;  $\gamma$ -ray detector array consisting of 19 Compton-suppressed HPGe detectors at the target position; recoil-decay tagging technique; Measured:  $\gamma\gamma$  coin,  $\alpha$  gated  $\gamma\gamma$  coin,  $E\alpha$ ,  $I\alpha$ ,  $T_{1/2}$ ,  $E\gamma$ ,  $I\gamma$ ; Deduced: level scheme.

**2002Do19:** produced using  $^{168}\text{Er}(^{36}\text{Ar},4n\gamma)$ ,  $E(^{36}\text{Ar})=175$  MeV; Target: self-supporting metallic target with thickness of  $500 \mu\text{g}/\text{cm}^2$  and highly enriched in  $^{168}\text{Er}$  (the exact amount was not specified by the authors); Detectors: gas-filled recoil separator; position-sensitive passivated, ion-implanted planar silicon detector, multiwire gas-filled parallel-plate avalanche counter and a single HPGe detector at the focal plane; detector array consisting of 22 Compton-suppressed HPGe detectors at the target position, recoil-decay tagging technique; Measured:  $\gamma\gamma$  coin,  $\alpha$ -gated  $\gamma\gamma$  coin,  $E\alpha$ ,  $I\alpha$ ,  $T_{1/2}$ ,  $E\gamma$ ,  $I\gamma$ ; Deduced: level scheme.

 $^{200}\text{Rn}$  Levels

E(level) <sup>†</sup>	J $\pi$ <sup>‡</sup>	$T_{1/2}$	Comments
0.0	0 <sup>+</sup>	1.03 s 3	$T_{1/2}$ : From Adopted Levels.
432.60 20	2 <sup>+</sup>		
936.3 3	4 <sup>+</sup>		
1500.6 4	6 <sup>+</sup>		
1776.3 4	6 <sup>+</sup>		
2033.6 4	8 <sup>+</sup>		
2114.0 4	8 <sup>+</sup>		
2300.5 5	9 <sup>-</sup>		
2300.5+x 4		25 $\mu\text{s}$ +11-6	<a href="#">Additional information 1.</a> E(level): From the measured delayed $\gamma$ -ray intensities, <a href="#">2002Do19</a> concludes that the isomer feeds the 2300.5-keV and 2033.6-keV levels. $T_{1/2}$ : From time differences between the implanted recoils and delayed $E\gamma$ observed at the focal plane. Only events correlated with $E\alpha(^{200}\text{Rn})$ were considered.
2554.1? 5	(10 <sup>+</sup> )		
2776.2? 6	(12 <sup>+</sup> )		

<sup>†</sup> From a least-squares fit to  $E\gamma$ .

<sup>‡</sup> From [2002Do19](#), based on the deduced  $\gamma$ -ray transition multiplicities.

 $\gamma(^{200}\text{Rn})$ 

$E_\gamma$ <sup>†</sup>	$I_\gamma$ <sup>†</sup>	$E_i(\text{level})$	J $\pi_i$ <sup>†</sup>	$E_f$	J $\pi_f$ <sup>†</sup>	Mult. <sup>†</sup>
<sup>x</sup> 160.9 <sup>‡</sup> 3						
<sup>x</sup> 182.8 <sup>‡</sup> 3						
222.1 <sup>&amp;</sup> 3	5 2	2776.2?	(12 <sup>+</sup> )	2554.1?	(10 <sup>+</sup> )	
257.3 2	28 4	2033.6	8 <sup>+</sup>	1776.3	6 <sup>+</sup>	(E2)
266.9 2	14 4	2300.5	9 <sup>-</sup>	2033.6	8 <sup>+</sup>	(E1+M2)
<sup>x</sup> 429.1 <sup>#</sup> 3	10 2					
432.6 2	100	432.60	2 <sup>+</sup>	0.0	0 <sup>+</sup>	(E2)
440.1 <sup>&amp;</sup> 3	22 2	2554.1?	(10 <sup>+</sup> )	2114.0	8 <sup>+</sup>	
<sup>x</sup> 482.6 <sup>#@</sup> 3	12 2					
<sup>x</sup> 492.1 <sup>#</sup> 3	14 2					
503.7 2	80 8	936.3	4 <sup>+</sup>	432.60	2 <sup>+</sup>	(E2)
564.3 2	35 3	1500.6	6 <sup>+</sup>	936.3	4 <sup>+</sup>	(E2)

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**(HI,xn $\gamma$ ) 1996Ta18,2002Do19 (continued)** $\gamma(^{200}\text{Rn})$  (continued)

$E_\gamma$ †	$I_\gamma$ †	$E_i(\text{level})$	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult. †
613.4 2	19 4	2114.0	8 <sup>+</sup>	1500.6	6 <sup>+</sup>	(E2)
840.0 2	30 5	1776.3	6 <sup>+</sup>	936.3	4 <sup>+</sup>	(E2)

† From 2002Do19.  $I_\gamma$  are prompt intensities determined by gating on  $E\alpha(^{200}\text{Rn})$  at the focal plane. Mult. are from a three point  $\gamma(\theta)$  analysis.

‡ Observed only at the focal plane (delayed) and correlated with  $E\alpha(^{200}\text{Rn})$ , presumably following the decay of the isomer (2002Do19).

# Observed only at the target position (prompt) and correlated with  $E\alpha(^{200}\text{Rn})$  at the focal plane (2002Do19).

@ Proposed above the 25  $\mu\text{s}$  isomer (2002Do19).

& Placement of transition in the level scheme is uncertain.

x  $\gamma$  ray not placed in level scheme.

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## Legend

## Level Scheme

Intensities: Relative  $I_\gamma$ 

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

