RDDS Lifetime Measurement on 140Sm using the Eagle Spectrometer in Warsaw

F. Bello, A Görgen et al. Center for Accelerator-based Research and Energy Physics, University of Oslo



C. Mihai et al. Horia Hulubei National Institute of Physics and Nuclear Engineering, Bucharest



J. Srebrny et al. Heavy Ion Laboratory, University of Warsaw







Beyond mean field calculations predict a shape transition from $^{\rm 140}{\rm Sm}$ to $^{\rm 142}{\rm Gd}$













$^{20}Ne + ^{124}Te \rightarrow ^{140}Sm + 4n$

Entry states for channel 4n0p0a d^2(sigma)/(dE dI) [mb/(MeV*hbar)]



COMPA: entry-state distribution significant population of low-spin states \Rightarrow decay path bypassing 10⁺ isomers

CERN-ISOLDE ¹⁴⁰Sm Coulomb excitation experiment - July 2012



30

0

60

90

 θ_{CM} (deg)

120

150 180













Total projection of γ - γ matrix (forward detectors)







Gated in the shifted peak of the $4^+ \rightarrow 2^+$ transition

Total projection of γ - γ matrix (forward detectors)



Channel

Total projection of $\gamma\text{-}\gamma$ matrix (forward detectors)



50 µm

Channel







$$\tau(x) = \frac{\{B_s, A_u\}(x)}{\frac{d}{dx}\{B_s, A_s\}(x)} \cdot \frac{1}{v}$$

A. Dewald et al. PPNP 67 (2012)



 $T(E2) = 1.22 \times 10^9 E_{\gamma}^5 B(E2)$

$$B(E2;2^+_1 \rightarrow 0^+) = 2090 \pm 112 e^2 fm^4$$

M.Girod, J.-P.Delaroche CEA Bruyères-le-Châtel

I_i	I_f	$M(E2; I_i \to I_f)(eb)$	$B(E2; I_i \to I_f)(eb)$
2_{1}^{+}	0^+_1	$1.117^{+0.05}_{-0.05}$	$0.250^{+0.02}_{-0.02}$
2_{1}^{+}	2_{1}^{+}	$-0.18^{+0.43}_{-0.29}$	-
4_{1}^{+}	2_{1}^{+}	$1.639^{+0.05}_{-0.05}$	$0.299^{+0.02}_{-0.02}$
0^+_2	2_{1}^{+}	$1.010^{+0.07}_{-0.07}$	$1.02^{+0.15}_{-0.15}$

with 2⁺ lifetime as additional constraint

I_i	I_f	$M(E2; I_i \to I_f)(eb)$	$B(E2; I_i \to I_f)(eb)$
2_{1}^{+}	0^+_1	$1.025_{-0.02}^{+0.02}$	$0.210^{+0.01}_{-0.01}$
2_{1}^{+}	2^{+}_{1}	$-0.36^{+0.29}_{-0.23}$	-
4_{1}^{+}	2^{+}_{1}	$1.625_{-0.05}^{+0.05}$	$0.293^{+0.02}_{-0.02}$
0^{+}_{2}	2_{1}^{+}	$0.995^{+0.07}_{-0.07}$	$0.991^{+0.15}_{-0.14}$





$I_i I_f M(I)$	$E2; I_i \to I_f)(eb) \ \mathcal{B}(E)$	$22; I_i \to I_f)(eb)$		
$2^+_1 \ 0^+_1$	$1.117^{+0.05}_{-0.05}$	$0.250^{+0.02}_{-0.02}$		
$2^+_1 2^+_1$	$-0.18^{+0.43}_{-0.29}$	-		
$4_1^+ 2_1^+$	$1.639^{+0.05}_{-0.05}$	$0.299^{+0.02}_{-0.02}$		-
$0^+_2 2^+_1$	$1.010^{+0.07}_{-0.07}$	$1.02^{+0.15}_{-0.15}$	(0+)?	

with 2⁺ lifetime as additional constraint





4+





 $2^+_I \rightarrow 0^+$

516.5

520.9

456.8



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Thanks



Distance