(HI,xnγ) 2005Ro40,2006Ta08

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Yu. Khazov, A. Rodionov and G. Shulyak	NDS 136, 163 (2016)	14-Jul-2016

1993Li18: ^{92}Mo(^{58}Ni,3npγ), E=287 MeV; the first observation of ^{146}Tm(p) decay. Two proton peaks were reported. Recoil Separator, plantation detection system.

2001Ry01,2003Gi10,2006Ta08,2007BaZQ: ^{92}Mo(^{58}Ni,3npγ), E=297 MeV; measured ^{146}Tm(p): E(p), Ip, $T_{1/2}$(p). Deduced levels, J^{π}, configurations. Ion-beam facility at HRIBF, recoil mass-separator. Particle-core vibration coupling model.

2005Ro40,2007DaZU: ^{58}Ni(^{92}Mo,3npγ), E not given; measured Eγ, Iγ, γγ, (recoil)γ coin., ^{146}Tm(p): E(p), Ip, $T_{1/2}$(p). Deduced levels, J^{π}, band. Gammasphere array, Fragment Mass Analyzer, RDT technique.

Others: 2001Ry02, 2005Bb02.

The level scheme of ^{146}Tm was studied by two experimental groups using the reactions ^{92}Mo(^{58}Ni,3npγ) and ^{58}Ni(^{92}Mo,3npγ). Five delayed proton lines were detected and half-lives of p-decaying states were measured. In the first reaction (2006Ta08), the g.s., J=(5$^-$), $T_{1/2}$=68 ms *3* and the isomer J=(10$^+$), $T_{1/2}$=198 ms *3* were determined; in the second reaction (2005Ro40,2007DaZU), g.s., J=(1$^+$), $T_{1/2}$=155 ms *2*, two excited states J=(5$^-$), $T_{1/2}$=82 ms *4*, J=(10$^+$), $T_{1/2}$=213 ms *9* were determined. In actual fact, according to systematics of odd-odd N=77 isotones ^{140}Eu and ^{142}Tb have g.s., J=1$^+$, however, g.s. of ^{144}Ho is determined as J=5$^-$ by 2006Ta08 and also by 2010Ma08 for the ^{144}Ho. The J=1$^+$ appears above the g.s. for ^{144}Ho and also for ^{146}Tm due to filling of the $d_{5/2}$ proton orbital. For this reason, the evaluators give preference to the level scheme of ^{146}Tm with g.s., J=(5$^-$).

^{146}Tm Levels

E(level)†	J^{π}‡	$T_{1/2}$#	Comments
0.0	(5$^-$)	68 ms *5*	%p=?; %ε+%β$^+$=14 %ε+%β$^+$ estimated in 2006Ta08. J^{π}: configuration=53%[πh$_{11/2}$⊗νs$_{1/2}$⊗0$^+$]+41%[πh$_{11/2}$⊗νs$_{1/2}$⊗2$^+$]+4%[πf$_{7/2}$⊗νs$_{1/2}$⊗2$^+$]+2%[πs$_{1/2}$⊗ν$_{11/2}$⊗0$^+$] (2006Ta08). Proton lines in decay to ^{145}Er (2006Ta08): *i*) branch E(p)=1191 keV *1*, I(p)=100.0% *3*, $T_{1/2}$(p)=68 ms *2* to the g.s., J^{π}=(1/2$^+$), l(p)=5; *ii*) branch E(p)=1016 keV *4*, I(p)=26.8% *16*, $T_{1/2}$(p)=66 ms *5* to the excited state E=175 keV *4*, J^{π}=(3/2$^+$), l(p)=3; *iii*) branch E(p)=938 keV *4*, I(p)=20.0% *13*, $T_{1/2}$(p)=66 ms *4* to the excited state E=253 keV *4*, J^{π}=(11/2$^-$), l(p)=0.
182@ *4*	(10$^+$)	198 ms *3*	%p=?; %ε+%β$^+$=? Additional information 1. E(level): calculated from E(p) proton lines by evaluators. J^{π}: configuration=55%[πh$_{11/2}$⊗νh$_{11/2}$⊗0$^+$]+42%[πh$_{11/2}$⊗νh$_{11/2}$⊗2$^+$]+2.5%[πf$_{7/2}$⊗νh$_{11/2}$⊗2$^+$]+0.5% others (2006Ta08). Proton lines in decay to ^{145}Er (2006Ta08): *i*) branch E(p)=1120 keV *1*, I(p)=100% *1*, $T_{1/2}$(p)=198 ms *2* to the excited state E=253 keV *4*, J^{π}=(11/2$^-$), l(p)=5; *ii*) branch E(p)=889 keV *8*, I(p)=1.0% *4*, $T_{1/2}$(p)=200 ms *40* to E=484 keV *9*, J^{π}=(13/2$^-$) l(p)=3.
658.0@ *10*	(12$^+$)		
991.3@ *13*	(13$^+$)		
1365.7@ *13*	(14$^+$)		
1804.7@ *17*	(15$^+$)		

† From a least-square fit to Eγ data except E(level)=182 keV.
‡ From 'Adopted Levels, Gammas.
# From I_p(t) 2006Ta08, 2007BaZQ.
@ Band(A): Possible πh$_{11/2}$νh$_{11/2}$ (2005Ro40).

(HI,xnγ) 2005Ro40,2006Ta08 (continued)

$\gamma(^{146}Tm)$

E_γ [†]	E_i(level)	J_i^π	E_f	J_f^π
333	991.3	(13^+)	658.0	(12^+)
374	1365.7	(14^+)	991.3	(13^+)
439	1804.7	(15^+)	1365.7	(14^+)
476	658.0	(12^+)	182	(10^+)
708	1365.7	(14^+)	658.0	(12^+)

[†] From fig. 2 of 2005Ro40; assumed ΔE equals 1 keV.

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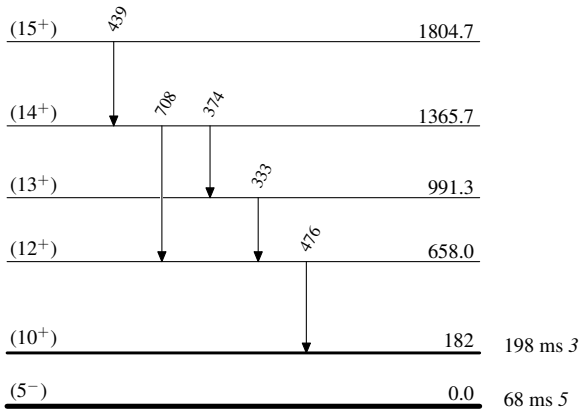
Level Scheme



$^{146}_{69}Tm_{77}$

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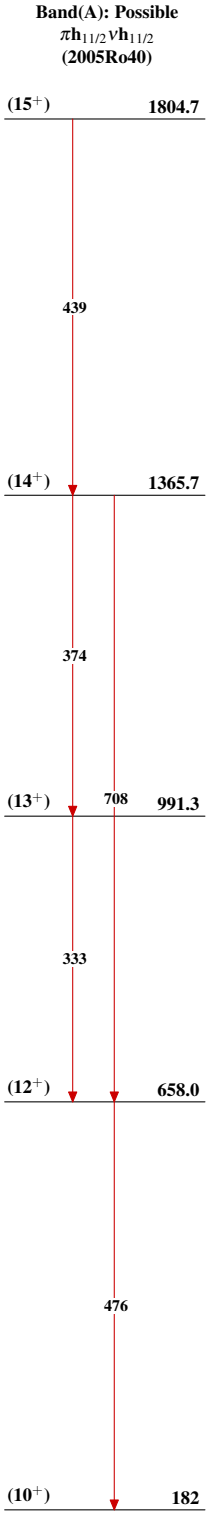

$^{146}_{69}Tm_{77}$