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SEARCH FOR HIGH SPIN ISOMERS IN THE Er AND Ho REGION

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SEARCH FOR HIGH SPIN ISOMERS IN THE Er AND Ho REGION

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Since the first systematic search for high spin isomers in the region near the N = 82 shell closure[1] many uncertainties still remain in this field. Indeed, in many cases the final nuclei in which these isomers have been found are not yet surely known[2]. Simultaneously with other groups[3-5], we have undertaken an experimental study to explore this region of deformed nuclei.

10-20 mg/cm^2 targets of ^{141}Pr, ^{144}Sm and ^{147}Sm were bombarded with 70-130 MeV ^{12}C, ^{14}N and ^{16}O beams from the Grenoble cyclotron. The Ge(Li) γ-ray spectra were recorded between the beam bursts in coincidence with gammas detected by a multiplicity filter consisting of 14 NaI detectors.

Short half-lives (up to ∿ 20 ns) were measured in Ge(Li)-RF coincidence experiments and long ones deduced from Ge(Li)-NaI coincidences. The ^{151}Er long half-life was obtained from γ decay using a mechanical beam chopper. The average delayed multiplicities $\overline{M}_d$ are determined from the ratios of γ-intensities in the x-fold coincidence spectra. The excitation energies in column 4 are obtained by summation of the individual γ-rays energies, taking into account the γ-γ coincidences relationships. When no precise informations are available, the spins are estimated by the relation $I_{is} = 1.7\,\overline{M}_d + I_o$ where I_o is the spin of the ground state or of a lower isomeric level.

The identification of Er and Ho final nuclei which contain high spin isomers was achieved through excitation function measurements and cross-bombardments. The assignments of the $^{150-153}$Ho isotopes which were previously uncertain by one mass unit are unambiguously established for the first time by our experimental results. The case of ^{151}Ho has been studied in detail and its level structure is known up to 6.1 MeV

	$T_{1/2}$	$\overline{M}_d$	E_{is}	I_{is}
^{153}Er	450±50 ns	5.6±1.0	≥2.75	25/2
	350±50 ns	8.6±1.0	≥5	37/2
^{152}Er	3.5±1.0ns	9±2	≥4.29	14
^{151}Er	35±10 ns	14±2	≥7	24
	6±2 ns		1.14	13/2
^{153}Ho	0.62±0.02s	3.0±0.5	>2.5	27/2
	40±10 ns			
	240±20 ns	≥4.8		>27/2
^{152}Ho	340±20 ns			
	10±3 ns			
	55±10 ns	6.5±1.0	≥2.87	20
	70±10 ns			
^{151}Ho	2≤T≤200 μs	4.5±0.5	≥2.8	16
	3±1 ns	12±1		
	5≤T≤200 μs	11±1	>6.14	≥49/2
^{150}Ho	20±10 ns			11
	80±15 ns	7±2	≥2.5	23
^{149}Dy	25±5 ns	8±1	>6.1	53/2
^{148}Tb	1.3±0.5μs	11.8±1.0	>6.6	29

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