THE HARD γ RADIATION OF Ag^{110*}

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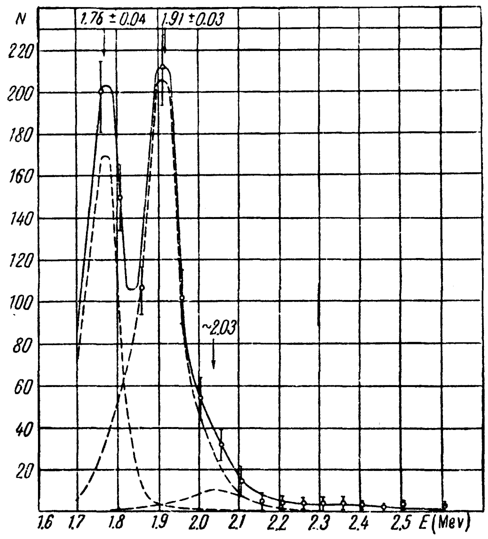
DZHELEPOV and Iarytsina[1] have shown that in the β decay of Ag^{110*} ($T \sim 250$ days) γ rays with energies of 1.67 to 2.26 Mev are emitted, whose intensity is $\sim 8 \times 10^{-4}$ quanta per disintegration, if one assumes $h\nu = 1.8$ Mev. We undertook an investigation of the γ radiation of Ag^{110*} with energies greater than 1.6 Mev, using a gamma hodoscope. The method and the construction of the apparatus have been described earlier.[2,3]

The source was a neutron-activated silver powder sample (7.62 g) contained in a glass test tube. The measurements were done 4 to 9 months after the preparation of the source. The source activity at the start of the measurements was ~ 700 mCu.

The measurements were carried out at magnetic field intensities of H = 700, 730, 760, 810, and 865 oersteds. The data on energies and intensities of the observed γ lines, as well as the H values at which the lines are observed are given in the table. The figure shows the shape of the γ spectrum of Ag^{110*} for H = 760 oersteds, after subtracting the background. The resolution of the spectrum into components was done taking account of the dependence of the apparatus line shape on $h\nu$ and H. In resolving the spectrum we also took account of the contribution from bremsstrahlung (both internal and external) which is produced in the target because of the presence of a β transition with endpoint ~ 2.88 Mev. The computation of the experimental spectrum of the bremsstrahlung was made on the assumption that the hard β transition constitutes 3% of the total number of



decays. In the region of 2.15 to 2.35 Mev, (H = 865 Oe), the bremsstrahlung contribution reaches $\sim 25\%$ of the observed effect.

The errors in determining the relative intensities are due to inexact knowledge of the spectral sensitivity, statistical errors of the measurements, inaccuracy in resolving the spectrum into components, and in the case of the γ rays in the region 2.0 to 2.5 Mev to error in estimating the bremsstrahlung contribution. The portion of the spectrum in the region 2.05 to 2.30 Mev cannot be uniquely resolved into components because of the smallness of the effect and the relatively large statistical error of the measurements ($\sim \pm 50\%$). The results of one method of resolution are given in parentheses in the table.

Our measurements permit evaluation of the absolute intensity of the observed γ rays if one assumes in accordance with the data of Dzhelepov, Zhukovskii, and Kondakov[4] that the intensity of the 1.506 Mev line is 1.46×10^{-1} quanta per disintegration (cf. column 4 of the table). However this evaluation can only be done approximately, since the γ spectrum of Ag^{110*} has three close lines with energies 1.48, 1.506, and 1.56 Mev and relative in-

$h\nu$ (Mev)	H, at which the γ line is observed	Relative intensity $I/I_{1.91}$	I, quanta/disintegration	
			according to the decay scheme of Ref. 4, $I_{1.506} = 0.146$	from the efficiency of the gamma hodoscope
1.48—1.56	700	58700		
1.5—1.56	730	—		
1.76±0.04	700; 730; 760; 810	160±30	$6.0 \cdot 10^{-4}$	$5.9 \cdot 10^{-4}$
1.91±0.03	700; 730; 760; 810; 865	100	$3.7 \cdot 10^{-4}$	$3.6 \cdot 10^{-4}$
~2.03	760; 810; 865	6±3	$2.3 \cdot 10^{-5}$	$2.3 \cdot 10^{-5}$
(2.09) (2.22)	865 } 865 }	~2	$7 \cdot 10^{-6}$	$7 \cdot 10^{-6}$
2.46±0.05	810; 865	~0.85	$3.1 \cdot 10^{-6}$	$3.1 \cdot 10^{-6}$

tensities[4] of 6 : 15 : 1.3, which are not resolved in measurements with the gamma hodoscope.

The fifth column of the table contains rough values of the absolute intensities of the hard γ lines calculated starting from the known activity of the source, the coincidence counting rate for the individual lines and the efficiency of the gamma hodoscope. As one sees from the table, the intensity values obtained by the two different methods are in agreement.

Preliminary data on the results of the investigation of the hard γ radiation of Ag^{110*} were presented by us at the Seventh Annual Conference on Nuclear Spectroscopy in 1957.

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[2] B. S. Dzhelepov, Izv. Akad. Nauk SSSR, Ser. Fiz. **21**, 1580 (1957) [Columbia Techn. Transl. **21**, 1569 (1957)].

[3] O. V. Chubinskii, Izv. Akad. Nauk SSSR, Ser. Fiz. **21**, 1583 (1957) [Columbia Techn. Transl. **21**, 1572 (1957)].

[4] Dzhelepov, Zhukovskii, and Kondakov, Izv. Akad. Nauk SSSR, Ser. Fiz. **21**, 973 (1957) [Columbia Techn. Transl. **21**, 975 (1957)].

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