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ABSTRACT

By means of a germanium pair spectrometer, a weak 3.24 MeV gamma-ray has been found in the photon spectrum of ^{88}Y, indicating the presence of an electron capture branch to the 3.24 MeV level of ^{88}Sr. The log f_1t was found to be 8.2 ± 0.2, which is consistent with a $\Delta I = 2$ yes beta transition and with the spin-parity assignment 2^+ for this level.

The effectiveness of lithium-drifted germanium detectors as a tool for the study of gamma ray spectra has been amply demonstrated. In the search for weak, high-energy gamma rays, the use of a germanium detector in a pair-spectrometer arrangement is often advantageous, as very good signal-to-noise ratios may be obtained, and only "double-escape" peaks are observed[1,2]. We report here the measurement of a very weak beta branch of $^{88}_{39}Y$ to the 3.24 level in $^{88}_{38}Sr$ by means of detection of the 3.24 MeV gamma transition with a germanium gamma-ray pair spectrometer.

The levels of ^{88}Sr, an important nucleus from the point of view of the shell model (N=50, Z=38), are known mostly from the study of the beta decay of ^{88}Rb by Lazar, Eichler, and O'Kelley[3]. Only the first two excited states of ^{88}Sr (1.84 and 2.74 MeV) had been observed from ^{88}Y decay[4]. Since the decay energy of Y^{88} is known to be 3.62 MeV[4], it is of interest to determine the extent to which the 3.24 MeV level in ^{88}Sr is populated by its decay, and to learn more about the properties of this level.

The gamma-ray spectrum from a source of ^{88}Y was examined with a germanium pair-spectrometer described in ref. 2. In addition to pair peaks from the known 1.836 and 2.735 MeV gamma-rays, a weak pair peak was observed at 2.22±0.02 MeV, which corresponds to a gamma-ray of 3.24±0.02 MeV. The gamma-ray relative intensities, given in table 1, were deduced with use of the pair-peak efficiency curve of ref. 2. A singles spectrum was also recorded; in it a peak was observed at 2.22 MeV but in this case the interpretation is ambiguous since the energy coincides with that of the one-annihilation escape peak from the 2.735 MeV gamma-ray.

Calculation of the log ft for electron capture of ^{88}Y to the 3.24 MeV level was made by using the measured gamma-ray intensities together with the branching ratio $I_\gamma(3.24)/I_\gamma(1.39) = 0.23$ observed by Lazar et al.[3]) from ^{88}Rb decay. A decay energy $Q_{EC} = 3.62$ MeV was assumed[4]). The log f_0t was found to be 9.3 ± 0.2, which is compatible with interpretation of the transition as being of the $\Delta I=2$, yes type. This becomes log $f_1t = 8.2\pm0.2$ with application of the shape correction factor[5]). Since the spin-parity assignment 4- is considered fairly definite for ^{88}Y, this information strengthens the assignment 2+ made to the 3.24 MeV level of ^{88}Sr by Lazar et al.[3]) on the basis of the gamma-ray branching ratio.

The decay scheme of fig. 1 summarizes the ^{88}Y data.

One of us (M.S.) wishes to thank Professors I. Perlman and J. O. Rasmussen for their hospitality during his stay at the Lawrence Radiation Laboratory.

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Table 1

Gamma-rays observed in pair spectrum of the decay of ^{88}Y

Energy of pair peak (MeV)	Transition energy (MeV)	Relative intensity of pair peak	Relative efficiency	Relative intensity
0.814*	1.836	47250 ± 230	4.3×10^{-3}	100
1.713*	2.735	630 ± 30	9.2×10^{-3}	0.63 ± 0.04
2.22 ± 0.02	3.24 ± 0.02	14 ± 4	1.35×10^{-2}	$(9.5 \pm 3) \times 10^{-3}$

*These energies were taken as standards

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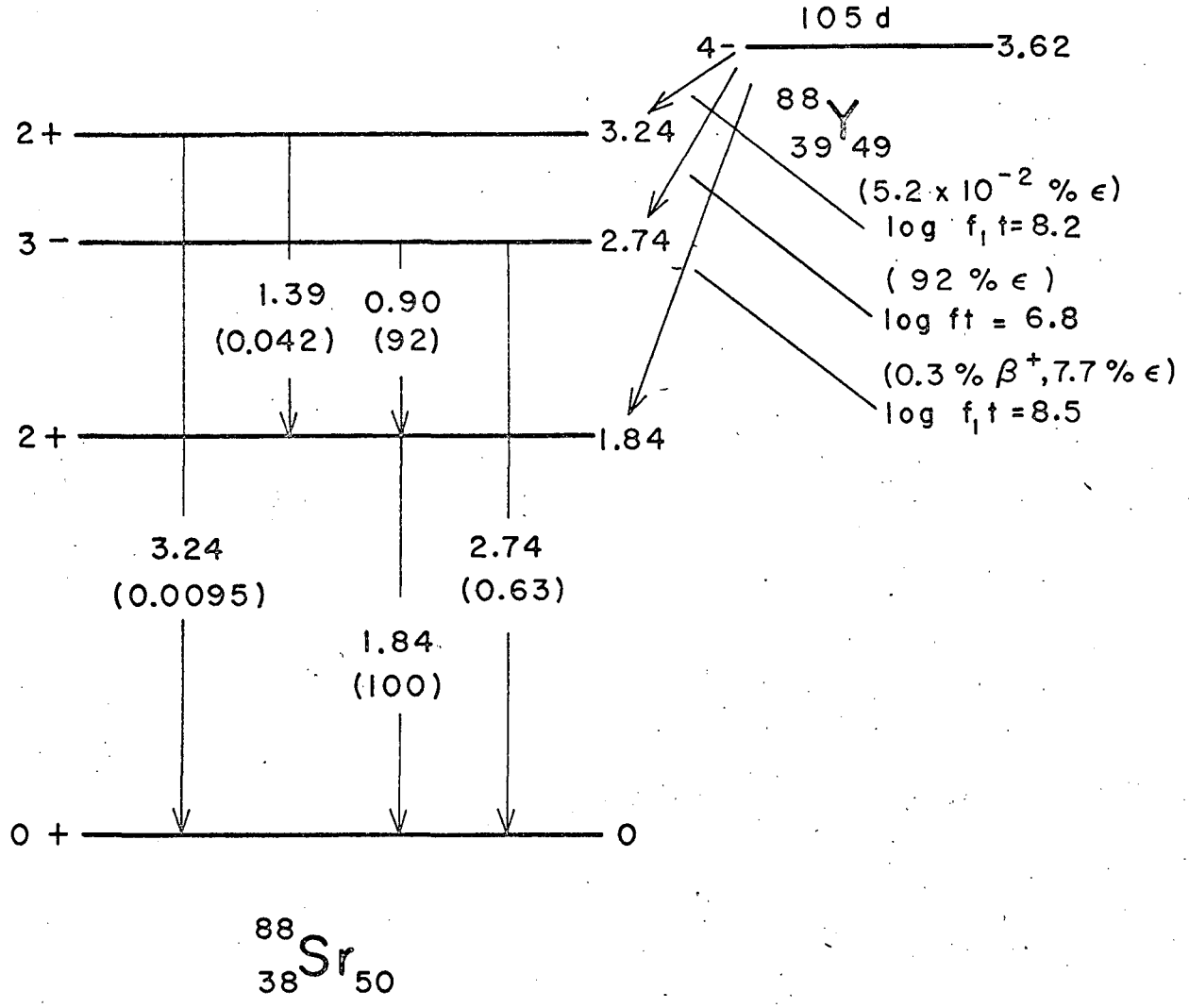

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Fig. 1. Decay scheme of ^{88}Y.

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