Letters to the Editor

INVESTIGATION OF THE $(N-Z)$ DEPENDENCE OF (n, n') AND $(n, 2n)$ CROSS SECTIONS ON THE BASIS OF EXPERIMENTAL NEUTRON SPECTRA[1]

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The strong $(N-Z)$ dependence of $(n, 2n)$ reaction cross sections [1—4] should also be found in the concurrent (n, n') processes. The two possible mechanisms forming the $(N-Z)$ dependence are as follows: 1. The gamma de-excitation of the unbound states is not negligible compared to the neutron emission. 2. The levels under the neutron binding energy are excited with a higher cross section than that predicted by the statistical model.

A systematic study of the cross sections from the nuclear level density approach [5—6] established a similar trend for some isotones.

The data concerning the excitation cross sections of the lowest [12] or all levels [11] below the $(n, 2n)$ reaction threshold are rather scare for the investigation of the trend.

The (N—Z) systematics was succesfully applied [7] to the prediction of the cross sections for isotopes and elements. These cross section are in good agreement with the $(n, 2n)$ cross sections for elements obtained by the neutron spectroscopic method [8—10]. At the same time this method [8—10] results in several cases a high gamma emission probability for the levels above the binding energy in agreement with other theoretical and experimental results [13]. These works show the importance of the first assumption for explaining the origin of the $(N-Z)$ dependence.

Measuring simultaneously the neutron spectra of $^{(56)}$Fe and ^{55}Mn, which are isotones, at a neutron energy of 14.4 MeV we have investigated the role of the gamma concurrence. The experimental conditions were similar to the earlier investigations [8—10]. According to the preliminary results the possible ranges of ratios for the emitted gammas and neutrons from unbound states are 0—0.26 for $^{(56)}$Fe and 0—0.1 for ^{55}Mn. These results

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are not disagreement with the $(N-Z)$ dependence and thus, in order to obtained a more definite conclusion, systematic measurements of neutron spectra of isotopes at some isotones are needed with an improved experimental technique.

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