



There is no Missing Isoscalar Monopole Strength in ^{58}Ni

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Till very recently there were still many questions connected with the IS E0 giant resonance in nuclei with $A < 90$. An important one being the problem of distribution of E0 strength and small amount of it observed in several nuclei. In Ref. [1] only 32% (at best <50%) of the IS E0 EWSR was observed in the (12 - 25) MeV region. In fact, these ^{58}Ni results increased uncertainties for the $A < 90$ nuclei.

In our preliminary calculations [2] we compared with the theory *only the form of the experimental spectra* for $^{58}\text{Ni}(\alpha, \alpha')$ reaction in the observed (12-25) MeV interval because there were no data about the corresponding absolute values in Ref. [1]. A good agreement with this experiment was obtained but our value of the IS E0 EWSR was equal to 71.4%. We concluded that a considerable part of the strength might be hidden in the experimental background [1].

Recently it was reported by the authors of Ref. [1] that they have extended the observed energy interval up to 35 MeV in several of the $A < 90$ nuclei including ^{58}Ni and found some additional IS E0 strength at higher excitation energies [3]. Thus, due to this fact and also with taking into account a continuum under the monopole peak 75-100% of the EWSR might be present below 35 MeV excitation energy [4]. In addition, absolute values of experimental cross sections are known at present [3]. It was necessary in Refs. [3,4] to subtract another background and therefore another additional strengths should appear under the previous (12-25) MeV interval. This can be clearly seen from Fig.1.

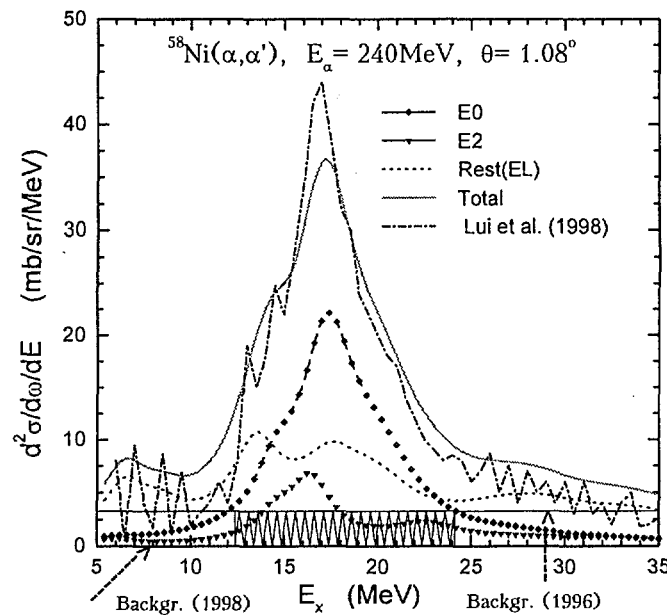


Fig. 1. The cross section of $^{58}\text{Ni}(\alpha, \alpha')$ reaction at $E_\alpha = 240\text{MeV}$ and $\theta = 1.08^\circ$. The experimental data (dash-dotted curve) were taken from Ref. [3]. The solid curve gives the total (summed) theoretical cross section, the dotted line ("Rest(EL)") corresponds to sum of the IS and IV E1, and IS E3 and E4 multipoles. The dashed area shows an additional IS E0 strength which could not be observed in the experiment of Ref. [1], see text. This area corresponds to 22% of the IS E0 EWSR.

In Ref.[1] the background was subtracted beginning from 25 MeV as it is shown by the upper border of the shaded area in Fig.1. In other words, only the part of the E0 resonance which is higher than this upper border could be observed in Ref.[1]. In recent experiment [3,4] the background was subtracted beginning from about 35 MeV, to be exact, the experimental data given in Fig.1 were counted from the new background which corresponds to zero on the vertical axis. So the shaded area in Fig.1 corresponds to the IS E0 strength which could not be observed in Ref. [1] and was observed in the newest experiment in addition to the old result in Ref. [1]. It is possible to estimate approximately the part of the IS E0 EWSR corresponding to this shaded area. The square of the area which is the sum of the shaded one and that of the E0 resonance upper than the shaded area is about 138.3 mb/sr/MeV. This figure corresponds to our 71.4% of the EWSR. The shaded area gives 42.6 mb/sr/MeV which corresponds to 22% of the IS E0 EWSR and was missed in the Ref. [1] experiment.

References

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