ISOSPIN MIXING IN THE COMPOUND NUCLEUS*

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ABSTRACT

The fact that isospin is approximately conserved in compound nucleus reactions proceeding via overlapping levels is well known. The aim of this talk is twofold: First, the consequences of isospin conservation for observables like average and fluctuating cross sections as well as for the decay widths are discussed. Second, the effect of isospin mixing between two classes of levels is introduced on the basis of a transport theory. It is shown that external mixing similar to the case of isolated isobaric analog resonances may dominate internal or bound state mixing. Hence, Coulomb matrix elements deduced for highly excited compound nuclei represent only upper limits. The size of external mixing depends upon the correlations between mirror channels. All these subjects will be illustrated by recent experimental data.

I. ISOSPIN CONSERVATION

Consequences of the concerned isospin quantum number T are developed for compound nucleus reactions with particular emphasis on statistical cross-section fluctuations. The formalism[1] is based on the Hauser-Feshbach and Ericson theories. Isospin dependent expressions for cross sections are given. The autocorrelation function in case of levels of two different isospin values in the compound nucleus contains an interference term between two Lorentzian functions that are associated with the

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two isospins. The formalism is applied to (p,p) and (p,α) reactions through the same compound nucleus.

2. ISOSPIN VIOLATION

In the framework of a transport theory[2] the formulation of dual isospin is extended to include isospin mixing. The extraction of isospin matrix elements from fluctuating excitation functions, evaporation spectra and direct charged particle reactions is discussed. A large amount of such matrix elements are now available which shows that there is no "typical" Coulomb matrix element but a strong dependence of this quantity on the level density.

The experimental isospin mixing matrix elements contain both external mixing and internal or bound state mixing. In order to obtain Coulomb mixing matrix elements, external mixing has to be subtracted. Until now this has not been done. The size of external mixing depends upon the correlations between mirror channels. They have recently been experimentally demonstrated[4]. Formulae[5] for cross section correlations between mirror channels are presented.

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