ISOSPIN SYMMETRY ALONG THE N=Z LINE IN sd SHELL

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One of the fundamental topics in nuclear physics is the isospin symmetry. It shows experimentally in nearly identical spectra in pairs of *mirror nuclei* (obtained interchanging protons and neutrons).

Interesting results concerning isospin multiplets have been obtained in the $1f_{7/2}$ shell, between ^{46}Cr and ^{54}Ni [1-3]. By comparing the excitation energies of analogue states (Mirror Energy Differences -*MED*- and Triplet Energy Differences -*TED*), several remarkable properties have been studied as a function of angular momentum along rotational bands. Both *MED* and *TED* have been reproduced in the framework of the shell model in the full *fp* shell. In particular a clear evidence of the nuclear isospin non-conserving term has been found [4].

It is interesting to extend these investigations to isospin multiplets in other shells. Recently, excited states have been studied in the *sd* shell [5,6] where irregular E1 transitions and unusually large *MED* have been observed for some states in A=35 and 39. It has been shown that in this mass region single-particle Coulomb contributions are essential to reproduce these large *MED* values.

In order to extend the experimental information on *sd* shell nuclei to high spin states we have performed an experiment at the Legnaro National Laboratory with the reaction ^{16}O + ^{24}Mg. The experimental setup was composed by the γ-ray spectrometer GASP, the charged-particle detector ISIS and the Neutron Ring. The mirror pairs A=31 and A=35 have been studied up to relatively high spins. New data on N=Z nuclei in this mass region (^{32}S and ^{34}Cl) have been also obtained.

These results can be interpreted with different modern shell model techniques. An important issue in describing nuclei of the mass $A\sim$30-40 with the shell model is that the *sd* shell space is not able to account for the high spin and negative parity states. Intruder configurations from higher shells become relevant and therefore effective interactions that take into account two main shells (*sd* and *fp*) are needed.

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