

Nuclear structure study of the mirror nuclei ^{22}Ne and ^{22}Mg around the ^{21}Na +proton threshold

lundi 8 octobre 2012 15:50 (30 minutes)

A comparison of the structure properties of ^{22}Ne and ^{22}Mg is interesting because in nucleosynthesis ^{22}Mg can be formed through the capture reaction $^{21}\text{Na}(p,\gamma)$ for which the cross sections will depend on spin-parity assignments of the ^{22}Mg states around the proton-emission threshold .

For the pair ^{22}Ne - ^{22}Mg , our calculations using the PSDPF interaction predict fifteen states in the excitation energy range up to ~ 6.35 MeV. Experimentally, fourteen states are reported in NNDC with well defined spin and parity for the ^{22}Ne . Twelve of them have positive parity and two of them have negative parity. Concerning the ^{22}Mg , sixteen states are reported, the majority of them having no fixed spin and parity.

In our contribution to the workshop, we will propose based on the shell model calculations a one to one level correspondence between ^{22}Ne and ^{22}Mg . In particular what the negative parity states are concerned, three states are identified in ^{22}Ne : 2- at 5146 keV, 3- at 5910 keV and 0- at ~ 6234 keV, they correspond to the mirror states in ^{22}Mg : 2- at 5006 keV, 3- at 5838 keV and 0- at 6046 keV.

Finally, we will present for the mirror nuclei ^{22}Ne - ^{22}Mg , a comparison between the shell model predictions obtained by the interaction PSDPF+Coulomb and the experimental level schemes and electromagnetic transitions.

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Classification de Session: Nuclear structure at the proton dripline

Classification de thématique: Nuclear structure at the proton dripline