SHELL-MODEL STRUCTURE OF EXOTIC NUCLEI AROUND CLOSED SHELLS

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The study of exotic nuclei in the regions of shell closures is currently the subject of great interest, with particular attention focused on the neighbors of doubly magic ^{132}Sn. The experimental study of these nuclei is very difficult, but in recent years new facilities and techniques have made it possible to obtain significant information on the spectroscopic properties of some of them. This makes it very interesting and timely to perform shell-model calculations not only to try to explain the available data, but also make predictions which may stimulate further experimental efforts.

To this end, we have studied [1-3] several nuclei around ^{132}Sn in terms of the shell model employing realistic effective interactions derived from the CD-Bonn free nucleon-nucleon potential. This is done by renormalizing the short-range repulsion of the latter through the $V_{\mathrm{low-k}}$ approach [4] and then calculating the model-space effective interaction within the framework of a folded-diagram formalism. No adjustable parameter appears in our calculations.

In our studies, we focus attention on those properties of exotic nuclei in the above region which are relevant to investigate the effects of the effective interaction when approaching the neutron drip line. In this regard, a key role is played by the proton-neutron multiplets in odd-odd nuclei.

In this talk, after a sketch of the theoretical framework, some selected results of our studies of neutron-rich nuclei beyond ^{132}Sn are presented. The experimental data are remarkably well reproduced by the theory, showing that our effective interaction is well suited to describe these nuclei. Based on these results, we may conclude that to explain the presently available data on exotic nuclei in the ^{132}Sn region there is no need to invoke shell-structure modifications.

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