

PARTIAL CONSERVATION OF SENIORITY IN NUCLEI

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Seniority in the structure of nuclei refers to the number of nucleons that are not in pairs coupled to angular momentum $J=0$, and therefore it probes the most important two-body correlation within nuclei, "pairing". Racah first introduced seniority in 1943 for the classification of complex atomic spectra and adapted it a few years later in the context of nuclear physics. Two key developments subsequent to Racah's original idea are: the treatment of neutrons and protons and the treatment of nucleons in several non-degenerate orbits. The conditions for seniority conservation will be briefly reviewed. The more recently discovered possibility of "partial" seniority conservation will be presented when most states are of mixed seniority but some remain pure. This explains the occurrence of nuclear seniority isomers, characterized by electromagnetic decay hindered by selection rules related to seniority. A simple analysis is presented of their possible formation with reference to the nickel isotopes 70-76Ni and the N=50 isotones from molybdenum to cadmium. It is shown that the existence of seniority isomers is predominantly governed by the quadrupole pairing matrix element of the nucleon-nucleon interaction.