Abstract Submitted
for the APR07 Meeting of
The American Physical Society

Exotic low-energy vibrational modes NICO ORCE, ESMAT ELHAMI, JASON HOLT, ANDREAS LINNEMANN, SHELLY LESHER, CHRISTOPH FRANSEN, NORBERT PIETRALLA, SHARMISTHA MUKHOPADHYAY, SADIA CHOUDRY, MARCUS SCHECK, VOLKER WERNER, MARCUS MCELLISTREM, TOM KUO, STEVE YATES, University of Kentucky — Nuclei near closed shells or subshells are often interpreted as exhibiting vibrational structures. Mixed-symmetry (MS) states are collective vibrational modes in which neutron and proton intrinsic g-factors are additive in the isovector part of the M1 magnetic dipole operator and may lead to large B(M1) values of $\sim 1\mu_N^2$. The fundamental MS mode in nearly-spherical nuclei is a 2^+ excitation ($2^+_{1,MS}$) with a strong M1 transition to the one-phonon 2^+_1 level and, typically, a rather weak E2 transition to the ground state. Exotic cases of MS states have recently been identified in ^{93}Nb and ^{94}Zr. The former, the first case of a MS state in a nearly spherical odd-mass nucleus, arises from the weak coupling between the bosonic core, ($2^+_{1,MS}$, ^{94}Mo), and the fermionic $\pi\ 2p^{-1}_{1/2}$ proton hole. The latter presents an anomalous case of quadrupole vibrations, where the MS state, $2^+_{1,MS}$, lies below the strongly anharmonic 2^+ two-phonon state (isoscalar), and the $2^+_{1,MS} \rightarrow 0^+_1$ transition is observed to have a larger E2 transition strength than the $2^+_1 \rightarrow 0^+_1$ decay. This material is based upon work supported by the U.S. National Science Foundation under Grant No. PHY-0354656.

Nico Orce
University of Kentucky

Date submitted: 03 Jan 2007 Electronic form version 1.4