[02/09/03 - Poster]

The two-level Lipkin model solution within the RPA approach for deformed fermions

E.I. DUZZIONI, J.R. MARINELLI

We use a Deformed Algebra formalism, the so-called Quon Algebra, to investigate the role of deformation in a approximate treatment of a many-body system in a simple schematic model. As previously shown, the many-body space for quons can be separated by their permutational symmetry properties [**1**]. As a further step, a method to build in a systematic way a quonic basis restricted to the antisymmetric subspace was recently developed [**2**]. We apply the method in order to find the RPA frequency and amplitudes as a function of the deformation parameter. We show that this dependence is very sensitive to small deviations from the pure fermionic case and that the frequency is renormalized by those deviations. Also, we conclude that the well-known RPA collapse still occurs, although the critical value for the interaction constant now depends on the deformation parameter. Finally, we show that it is possible to make our results converge to the exact solution, allowing for a dependence of the deformation parameter on the two-body interaction strength of the model.

References:

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[02/09/03 - Poster]

New Gamma Transitions in Ir-193 From The Beta Decay Of Os-193

GUILHERME SOARES ZAHN, CIBELE BUGNO ZAMBONI, FREDERICO ANTONIO GENEZINI, MARCUS PAULO RAELE, MANOEL TIAGO FREITAS DA CRUZ, JUAN YURY ZEVALLOS-CHÁVEZ

The population and the mode of decay of the excited levels of ^{193}Ir have been subjected of several gamma spectroscopy investigations using Na(Tl) and Ge(Li) detectors, but the beta decay scheme of ^{193}Os ($T_{1/2} = 30,6h$) is yet very incomplete. As the nucleus ^{193}Os occupies a central position in the complex transitional region between the deformed rare-earth nuclei and the spherical nuclei near Pb the investigation this beta decay suggest the opportunity to study the extent to which susceptibility to deformation affects the low-lying states of this transitional nucleus. These measurements were performed by using 5mg samples of metallic ^{192}Os enriched to 99% irradiated for a period of 20 minutes in the IEA-R1 reactor at IPEN (São Paulo), under a thermal neutron flux of $5 \times 10^{12} n.cm^2.s^{-1}$. The direct gamma-ray spectrum from about $30keV$ to $1,6MeV$ was recorded over more than 900 hours of live counting using a high-energy-resolution ($FWHM \approx 1.8keV$) HPGe spectrometer. In order to positively identify the origin of the γ-rays, spectra were accumulated through two successive half-lives. The precise energy calibration of γ transitions' spectra were taken with standard sources of ^{109}Cd, ^{133}Ba, ^{137}Cs and ^{152}Eu. The sources of ^{133}Ba and ^{152}Eu were also used for the relative efficiency calibration of the detector. Peak areas were evaluated by using the Idefix (IDF) computer code.

From singles spectra analysis the energies of 74 gamma rays have been determined with a better overall precision than previously, 16 of them at the first time. In addition, a number of γ-transitions were confirmed. Particularly, the energy of $1316,63(18)keV$, observed for the first time in this work, suggests that end point energy $Q_{\beta_{max}} = 1140,5(24)keV$ must be investigated.

[02/09/03 - Poster]

Angular correlation measurements in a ^{155}Eu nucleus

FREDERICO ANTONIO GENEZINI, CIBELE BUGNO ZAMBONI, MANOEL TIAGO FREITAS DA CRUZ, JUAN YURY ZEVALLOS-CHÁVEZ

The Eu nuclei are in the transitional deformation region and, therefore, it is of great theoretical interest to study their deformation changes as a function of the mass number and excitation energy, as well as to investigate the structure of their excited states. A recent bibliographic research shows that the levels of the ^{155}Eu nucleus were studied via β^-decay first by Ungrin et al [1] in 1969 using Ge(Li) and NaI(Tl) detectors, determining the most part part of levels of this nucleus. Only two studies that performed angular correlation measurements were found, the most recent was done in 1974 by Begzhanov et al. [2]. This indicated the need for further measurements. We performed angular correlation measurements with a system installed at the Linear Accelerator Laboratory of the Instituto de Física da Universidade de São Paulo. This is composed by four Ge detectors with the active volumes ranging from 50 to 190 cm^3. The fast-slow electronics associated to each detector was composed by a linear amplifier, a fast amplifier and a constant fraction discriminator. The linear outputs were fed to a four-input CAMAC analog-to-digital converter. The fast electronics output was fed to a home-made CAMAC module named as Multi, projected to manage signals of up to eigth detetectors, which generates a strobe to ADC and a start to time-to-diference converter. Our samples were composed of 5 mg of Samarium oxide, enriched to 98.7 % of ^{154}Sm.