

OBSERVATION OF NEW BAND STRUCTURES AT HIGH-SPIN VALUES
IN ^{194}Hg

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Recent studies [1,2,3] of the even mass isotopes $^{190-198}\text{Hg}$ have indicated that there exists in addition to the ground state band (gsb) a negative-parity sequence of levels with spins 5^- , 7^- , 9^- , ... and an isomeric 10^+ state. The discovery of enhanced E2 transitions [4] connecting these negative-parity levels together with the fact that in one case [2], namely ^{192}Hg , the sequence extends up to 15^- strongly suggests that this band has collective features. The intrinsic structure of these levels is probably composed of a decoupled $i_{13/2}$ neutron and a low-j neutron from the adjacent $3p_{3/2}$ or $2f_{5/2}$ orbitals [1]. On the other hand, the 10^+ isomers are considered to be predominantly constituted from the stretch-coupling of two $h_{11/2}$ proton holes, i.e. a $(\pi h_{11/2}^{-2})$ configuration [3].

In this communication we report on the results of an in-beam γ -spectroscopic investigation of ^{194}Hg , in which two new band structures emerged. The first is an even-spin sequence of states $8^{(-)}$, $10^{(-)}$, $12^{(-)}$, ... which is related to the odd-spin sequence outlined above, and the other is a band built upon the 2-proton-hole 10^+ isomer. The negative parity of the new side band (spin 8^- , 10^- , ...) was deduced from the strong negative anisotropy of the 227.7 keV transition indicating most probably M1+E2 character.

In our experiments ^{194}Hg was produced either through the $^{196}\text{Pt}(\alpha,6n)$ reaction, or the $^{194}\text{Pt}(\alpha,4n)$ reaction.

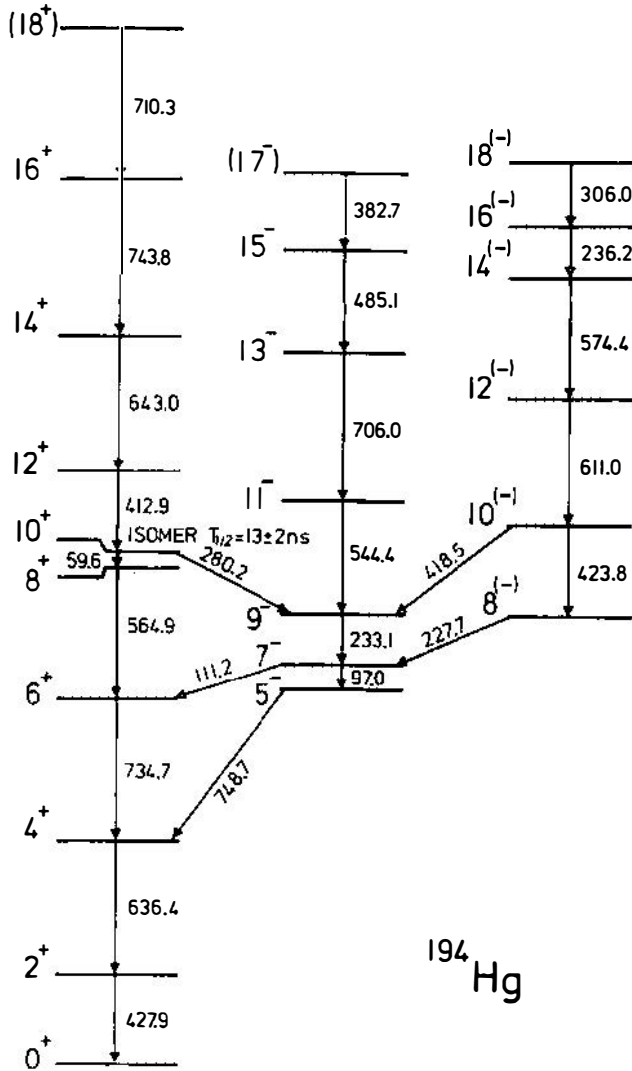


Fig.1. Level scheme for ^{194}Hg resulting from the present investigation.

γ_1 - γ_2 - t_{12} coincidences, γ -angular distributions, and timing of γ -rays against the beam bursts were recorded using Ge(Li) diodes. The level scheme for ^{194}Hg resulting from the present study is shown in Fig. 1. It confirms and extends earlier published work on this nucleus [2,3]. The γ -angular distributions show that the

intraband γ -transitions of the two new bands are of stretched quadrupole nature.

The energy spacings in the band based on the 10^+ 2-proton-hole state are remarkably similar to those observed in the gsb, which indicates that both bands have possibly a similar structure.

With regard to the negative-parity states in ^{194}Hg the sequence of even-spin states is a completely new feature in this region. The odd- and even-spin negative-parity levels are possibly members of a 2-quasineutron band including an $i_{13/2}$ neutron [5] which is markedly decoupled. Above the $8^{(-)}$ and $9^{(-)}$ states the effect of decoupling of the extra particles from the core can be seen from a comparison of the energy spacings in these bands with those in the gsb. Calculations have been carried out by Neergård et al. [5] in which two independent quasiparticles are coupled to a rotating core; it turns out that the resulting calculated levels contain an almost completely decoupled $i_{13/2}$ neutron, and that also the observed elevation of the even-spin members with respect to the odd-spin members can satisfactorily be accounted for. Finally it appears that the recent calculations of Alaga and Paar [6] in the framework of the particle-vibrator coupling scheme can also describe these new features in the ^{194}Hg level scheme.

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