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More than thirty bands in ^{177}Re

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Abstract

The level scheme of ^{177}Re has been extended extensively, with fragments of more than thirty bands, characterised by a given signature, observed. Alignments at low frequency in one-quasiparticle bands are interpreted as deformation effects and compared with the predictions of cranking calculations. The previously assigned one-quasiparticle $\pi i_{13/2}$ band is shown to be a mixture of three-quasiparticle and vibrational character. The non-observation of the one-quasiparticle $\pi i_{13/2}$ band is explained as being due to crossings of its s-band by competing bands. A number of high-K bands are also reported, including five- and seven-quasiparticle bands. Configuration assignments for these bands are aided by comparing experimental g_K values with "effective" g_K values, calculated with a semi-classical expression taking Coriolis mixing into account. The population of the yrast band was observed to oscillate with every four units of spin.

Keywords: NUCLEAR REACTIONS ^{130}Te(^{51}V,4n), $E = 225$ MeV; ^{163}Dy(^{19}F,5n), $E = 105$ MeV; measured E_γ, $\gamma\gamma$-coinc., I_γ. ^{177}Re deduced levels, J, π, configurations, rotational bands, $B(M1)/B(E2)$ ratios, $g_{(K)}$ values, alignments, band structure. Crossing frequencies, cranked shell model, band-mixing, Nilsson–Strutinsky potential energy surfaces, shape coexistence.

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