HIGH - SPIN STATES IN ^{48}Ti

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ABSTRACT

The high-spin states of ^{48}Ti have been investigated using the ^{45}Sc(α, pγ) reaction at E_α = 11 MeV. From p-γ angular correlation and DSA lifetime-measurements many prospective high-spin states have been located up to E_x = 8318 keV and $J \leq 12$. The data are compared with a recent $(f_{7/2})^n$ shell-model calculation by Kutschera et al. [1].

High-spin states in ^{48}Ti are expected to have the symmetry of cross-conjugation. The interchange of protons and neutron holes reproduces the wave function with either positive or negative sign (signature). The argument is valid in the case of a pure $(f_{7/2})^n$ configuration which should be realized in the high-spin states. A high-resolution study of the ^{45}Sc(α, pγ) reaction has yielded the γ-decay of more than 100 ^{48}Ti levels. From p-γ angular correlations and DSA lifetime-measurements most likely candidates for the high-spin states were obtained. Their excitation energies are in excellent agreement with a recent [1] $(f_{7/2})^n$ shell model calculation. The model also reproduces E2 transition rates of the $J \rightarrow J-2$ type and M1 transition rates of the $J \rightarrow J$ type between levels of opposite signature. In the case of $J \rightarrow J-1$ M1 transitions the recent calculation is in contrast to previous work by Lawson [2]. Lawson predicts, in agreement with the present experiment, that transitions between levels of different signature are strong and vanishing between levels of equal signature. The opposite is the case in ref. [1]

REFERENCES

1) W. Kutschera, B. A. Brown and K. Ogawa, Riv. Nuovo Cimento, to be published

2) R. D. Lawson, Nucl. Phys. A 173 (1971) 17

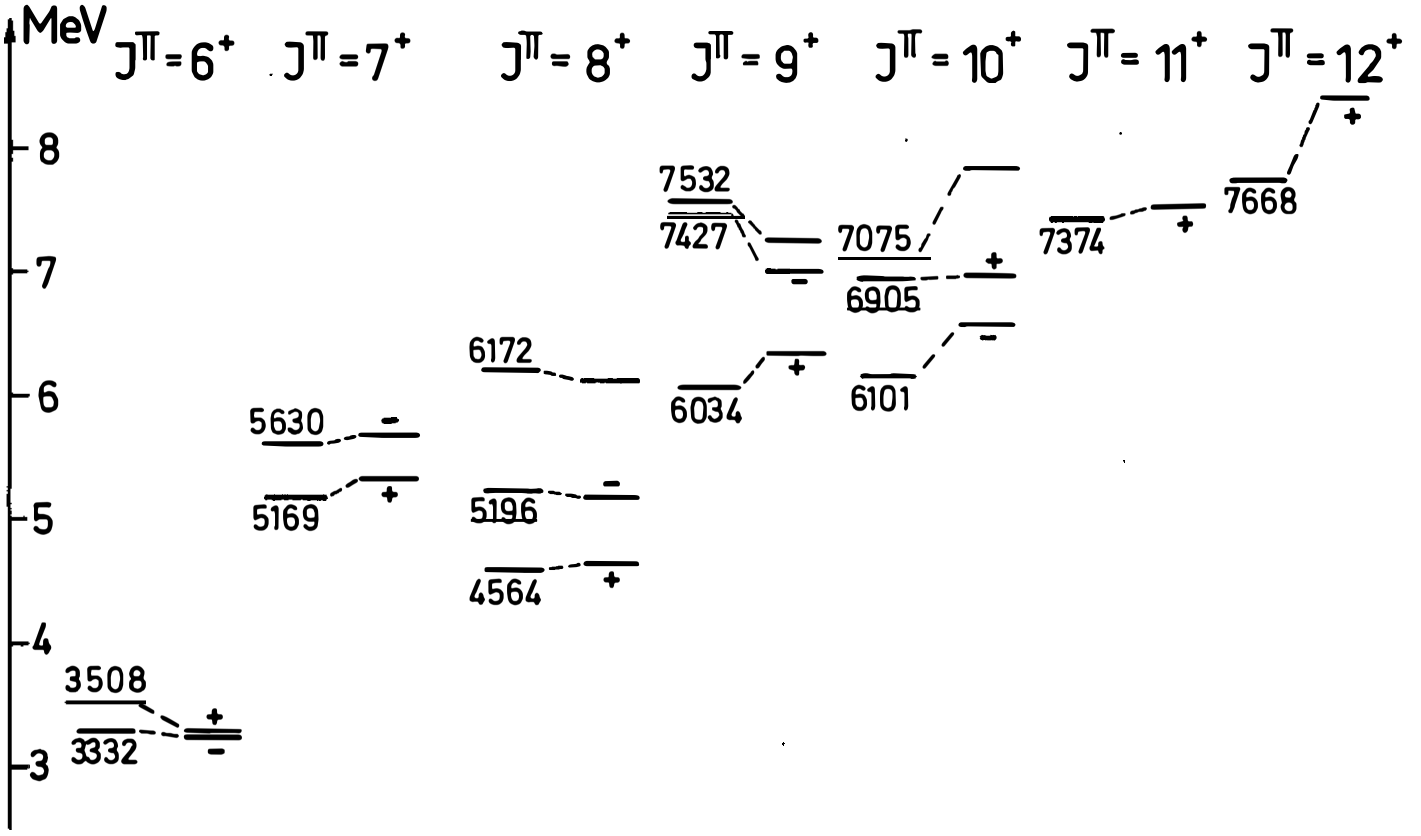

Fig. 1: High spin states in ^{48}Ti. Numbers give the experimental excitation energies (keV). The labels + - give the signature of levels in a $(f_{7/2})^n$ shell model calculation.