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Nuclear High-Spin Data for $A = 174, 176, \text{ and } 184$

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Nuclear high-spin data are important in the frontier areas of nuclear structure physics. Nearly all nuclear physics groups active in high-spin research maintain a computerized data file of the level schemes deduced from their own experiments. Furthermore, several of those groups have also made an effort to produce data files for specific mass regions that address the needs of their own research program. While some of these files may have had a common origin in the Niels Bohr Institute data file, each laboratory produced a separate data file which then evolved on its own. Attempts to standardize the diverging data files have not been successful, due mainly to the lack of an organizer devoted to this

task. Furthermore, the recent explosion of data on high-spin states, associated with the advent of sizable arrays of Compton-suppressed germanium detectors, has made it nearly impossible for any of the individual groups to maintain a comprehensive file for even a limited number of nuclides in the deformed region. In order to keep abreast of such developments it is essential that a high-spin data file be in place as soon as possible.

At U. S. Nuclear Data Network (USNDN) meeting held at Asilomar in October 1993, Sub-task force on high-spin data evaluation was set up in order to evaluate and compile the gamma-ray data from heavy-ion reaction.^[1] It was determined that a high-spin evaluation activity will be started at IAEA Advisory Group meeting held by the Lawrence Berkeley Laboratory, USA, in May 1994^[2].

High-spin data for $A = 174, 176, \text{ and } 184$ mass chains were evaluated during I visited Oak Ridge National Laboratory, USA in 1995

1 $A = 174$ High-Spin Data

The nuclear high-spin data for $A = 174$ has been evaluated using experimental nuclear high-spin data up to June 1995. The information for ^{174}Yb , ^{174}Lu , ^{174}Hf , ^{174}Ta , ^{174}W , ^{174}Re , ^{174}Os , and ^{174}Pt from various reaction experiments together with their adopted high-spin levels and gamma transition properties presented

There is a coulomb excitation data file in which 4 rotational bands exist in ^{174}Yb high-spin data

High-spin levels, gammas, $^{170}\text{Er}(^7\text{Li}, 3n\gamma)$, and $^{176}\text{Yb}(p, 3n\gamma)$ data files exist in ^{174}Lu high-spin data, where are 16 bands.

There are high-spin levels, gammas, $^{130}\text{Te}(^48\text{Ca}, 4n\gamma)$, $^{172}\text{Yb}(\alpha, 2n\gamma)$, $^{160}\text{Gd}(^{18}\text{O}, 4n\gamma)$, $^{175}\text{Lu}(p, 2n\gamma)$, $(d, 3n\gamma)$ in ^{174}Hf high-spin data, where are 17 bands.

High-spin levels, gammas, $^{160}\text{Gd}(^{19}\text{F}, 5n\gamma)$, $^{169}\text{Tm}(^9\text{Be}, 4n\gamma)$ data files exist in ^{174}Ta high-spin data, where are 4 bands.

High-spin levels, gammas, $^{159}\text{Tb}(^{19}\text{F}, 4n\gamma)$, $^{165}\text{Ho}(^{14}\text{N}, 5n\gamma)$, $^{162}\text{Dy}(^{16}\text{O}, 4n\gamma)$, $^{169}\text{Tm}(^{11}\text{B}, 6n\gamma)$ exist in ^{174}W high-spin data files, where are 3 bands.

There is a $^{159}\text{Tb}(^{20}\text{Ne}, 5n\gamma)$ data file in which rotational bands exist in ^{175}Re high-spin data

High-spin levels, gammas, $^{51}\text{V}(^{127}\text{I}, 4n\gamma)$, $^{146}\text{Nd}(^{32}\text{S}, 4n\gamma)$, $^{150}\text{Sm}(^{28}\text{Si}, 4n\gamma)$, $^{150}\text{Sm}(^{29}\text{Si}, 5n\gamma)$ exist in ^{174}Os high-spin data, where are 4 rotational bands.

$^{107}\text{Ag}(^{70}\text{Ge}, p2n\gamma)$, $^{144}\text{Sm}(^{33}\text{S}, 3n\gamma)$ exist in ^{174}Pt high-spin data, where is

only gs band.

2 $A = 176$ High-Spin Data

There is coulomb excitation data file in ^{176}Yb and ^{176}Lu high-spin data, respectively.

$^{174}\text{Yb}(\alpha, 2n\gamma)$, $^{176}\text{Yb}(\alpha, 4n\gamma)$ data file included $^{181}\text{Ta}(\pi^-, 5n\gamma)$ exists in ^{176}Hf high-spin data, where are 15 bands

There are high-spin levels, gammas, $^{170}\text{Er}(\ ^{11}\text{B}, 5n\gamma)$, $^{170}\text{Er}(\ ^{10}\text{B}, 4n\gamma)$, $^{173}\text{Yb}(\ ^7\text{Li}, 4n\gamma)$, and $^{175}\text{Lu}(\alpha, 3n\gamma)$ in ^{176}Ta high-spin data files, where are 4 bands;

High-spin levels, gammas, $^{150}\text{Nd}(\ ^{30}\text{Si}, 4n\gamma)$, $^{164}\text{Dy}(\ ^{16}\text{O}, 4n\gamma)$, $^{169}\text{Tm}(\ ^{11}\text{B}, 4n\gamma)$, $^{176}\text{Hf}(\alpha, 4n\gamma)$, $^{154}\text{Sm}(\ ^{26}\text{Mg}, 4n\gamma)$ data files exist in ^{176}W high-spin data, where are 6 bands.

High-spin levels, gammas, $^{159}\text{Tb}(\ ^{22}\text{Ne}, 5n\gamma)$, $^{165}\text{Ho}(\ ^{16}\text{O}, 5n\gamma)$, and $^{169}\text{Tm}(\ ^{12}\text{C}, 5n\gamma)$ exist in ^{176}Re high-spin data, where are 3 bands.

There are high-spin levels, gammas, $^{164}\text{Er}(\ ^{16}\text{O}, 4n\gamma)$, $^{152}\text{Sm}(\ ^{28}\text{Si}, 4n\gamma)$, and $^{162}\text{Dy}(\ ^{20}\text{Ne}, 6n\gamma)$ in ^{176}Os high-spin data, where are 4 bands.

$^{144}\text{Sm}(\ ^{35}\text{Cl}, p2n\gamma)$ data file exists in ^{176}Pt high-spin data, where are 3 hands.

3 $A = 184$ High-Spin Data

There is coulomb excitation data file in which two bands exist in ^{184}W high-spin data.

High-spin levels, gammas, $^{170}\text{Er}(\ ^{18}\text{O}, 4n\gamma)$, $^{182}\text{W}(\alpha, 2n\gamma)$, $^{184}\text{W}(\alpha, 4n\gamma)$, $^{185}\text{Re}(p, 2n\gamma)$, $^{186}\text{W}(\alpha, 6n\gamma)$, and $^{187}\text{Re}(p, 4n\gamma)$ data files exist in ^{184}Os high-spin data, where are 5 bands.

There are $^{174}\text{Yb}(\ ^{14}\text{N}, 4n\gamma)$, $^{175}\text{Lu}(\ ^{13}\text{C}, 4n\gamma)$, $^{176}\text{Yb}(\ ^{14}\text{N}, 6n\gamma)$, $^{176}\text{Lu}(\ ^{12}\text{C}, 4n\gamma)$ (HI, $xn\gamma$) data file of ^{184}Ir , where are 3 bands.

High-spin levels, gammas, $^{154}\text{Sm}(\ ^{34}\text{S}, 4n\gamma)$, $^{175}\text{Lu}(\ ^{14}\text{N}, 5n\gamma)$, and $^{177}\text{Hf}(\ ^{12}\text{C}, 5n\gamma)$ exist in ^{184}Pt high-spin data, where are 9 bands.

$^{161}\text{Dy}(\ ^{27}\text{Al}, 4n\gamma)$ and $^{165}\text{Ho}(\ ^{24}\text{Mg}, 5n\gamma)$ exist in (HI, $xn\gamma$) data file of ^{184}Au , where are 2 bands.

There is $^{156}\text{Gd}(\ ^{32}\text{S}, 4n\gamma)$ data file in which two hands exist in ^{184}Hg high-spin data.

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