^{9}Be(^{46}Ar,xγ) 2016Cr01

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 201,1 (2025)	31-Oct-2024

First evidence of a rotational band in ^{32}Mg, a nuclide situated in the region of "island of inversion".

2016Cr01: E=102 MeV/nucleon ^{46}Ar secondary beam was produced by fragmentation of 140 MeV/nucleon ^{48}Ca primary beam on a 846 mg/cm^2 ^{9}Be production target at NSCL. Fragments were separated by the A1900 fragment separator. The reaction target was 267 mg/cm^2 ^{9}Be target. Reaction products were analyzed with the S800 spectrograph. γ rays were detected with the GRETIAN array of seven modules each consisting of four 36-element segmented HPGe crystals. Measured Eγ, Iγ, $\gamma\gamma$-coin, (^{32}Mg)γ-coin. Deduced levels, J^π, ground-state rotational band. Comparison with Large-scale shell-model calculations with the SDPF-U-MIX effective interaction (mixing between different particle-hole, p-h configurations), and cranked shell-model calculations.

^{32}Mg Levels

E(level)[†]	J$^\pi$[‡]	Comments
0[#]	0$^+$	
886[#] *4*	2$^+$	
2324[#] *6*	4$^+$	
2546		
2861		
3124		
4097[#] *7*	6$^+$	E(level),J$^\pi$: reported in 2016Cr01. Energy and J^π values are consistent with shell-model calculations.

[†] From Eγ data.
[‡] From 2016Cr01.
[#] Band(A): Yrast g.s. rotational band. Shell-model calculations suggest that structure of this band changes from highly mixed (2-p,2-h and 4-p,4-h) configuration for the first 0$^+$ and 2$^+$ states to dominantly 4p-4h configuration for the yrast 8$^+$ state (2016Cr01).

γ(^{32}Mg)

E$_\gamma$[†]	I$_\gamma$[†]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$
886 *4*	100	886	2$^+$	0	0$^+$
[x]≈1000[‡]					
1438 *4*	52	2324	4$^+$	886	2$^+$
1660		2546		886	2$^+$
1773 *4*	12	4097	6$^+$	2324	4$^+$
1975		2861		886	2$^+$
2238		3124		886	2$^+$

[†] From 2016Cr01.
[‡] Observed in spectrum in coincidence with ^{32}Mg recoils but due to low statistics could not be placed in ^{32}Mg level scheme.
[x] γ ray not placed in level scheme.

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Level Scheme

Intensities: Relative I_γ

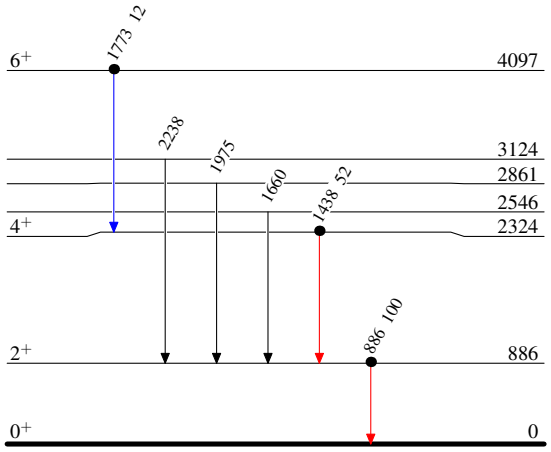
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

Coincidence



$^{32}_{12}Mg_{20}$

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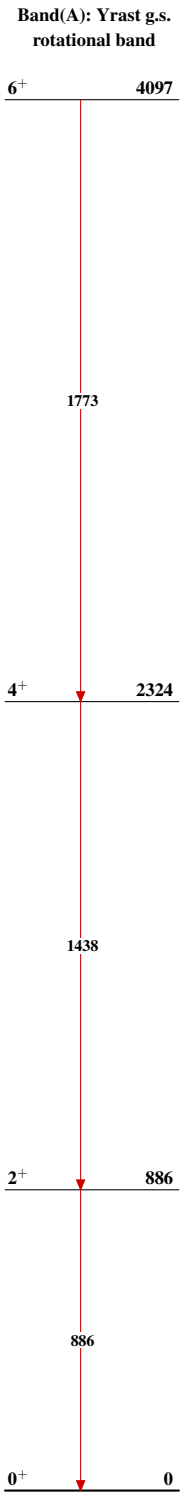

$^{32}_{12}Mg_{20}$