High spin states Interpretation of ^{135}Ba, ^{135}La and ^{135}Ce Nuclei within Cranked Nilsson-Strutinsky Model

S. Kaim,[1], I. Azeri,[1] A. Aboudi,[1] R. Belgharbi,[1] A. Laala [1]

[1]Université des Frères Mentouri Constantine1, Algérie

S. K ...p on N

Joint ICTP-IAEA Workshop on Nuclear Structure and Decay Data: Theory, Experiment and Evaluation | (smr 3242)

Outline

1. Introduction
2. Calculation code : CNS
3. Results and discussion

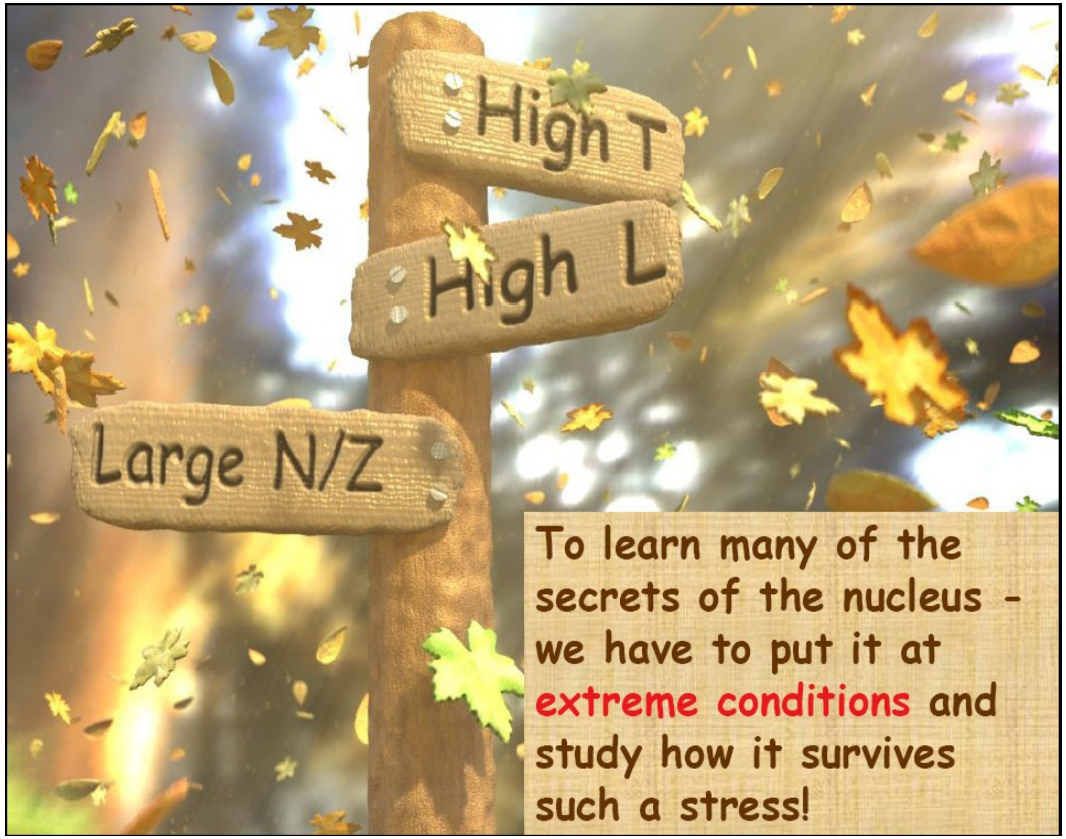
   ^{135}Ba

   ^{135}La

   ^{135}Ce

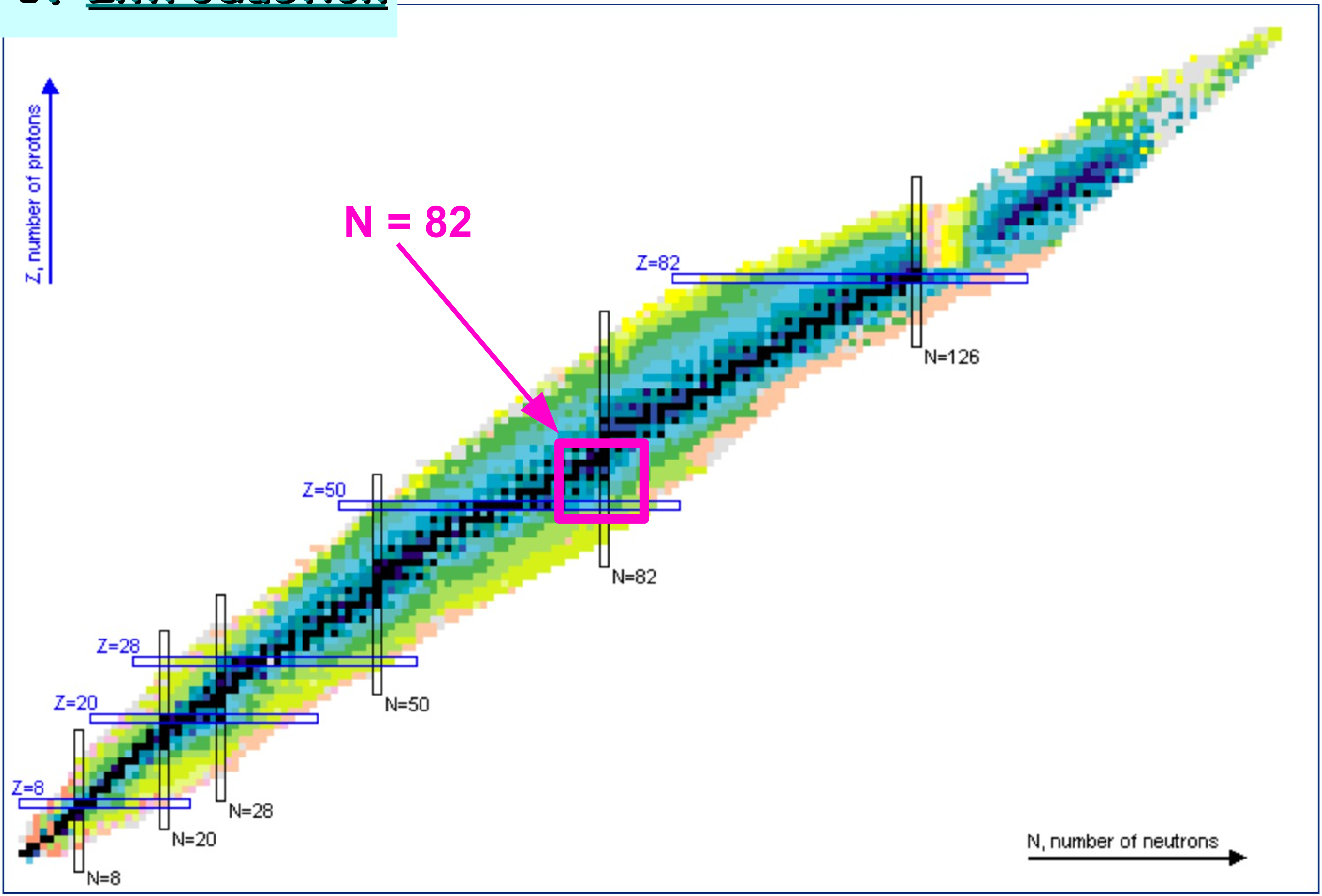
4. Summary

1. Introduction



- Increasing Angular Momentum and Excitation Energy is one of the most excellent ways to investigate nuclear structure

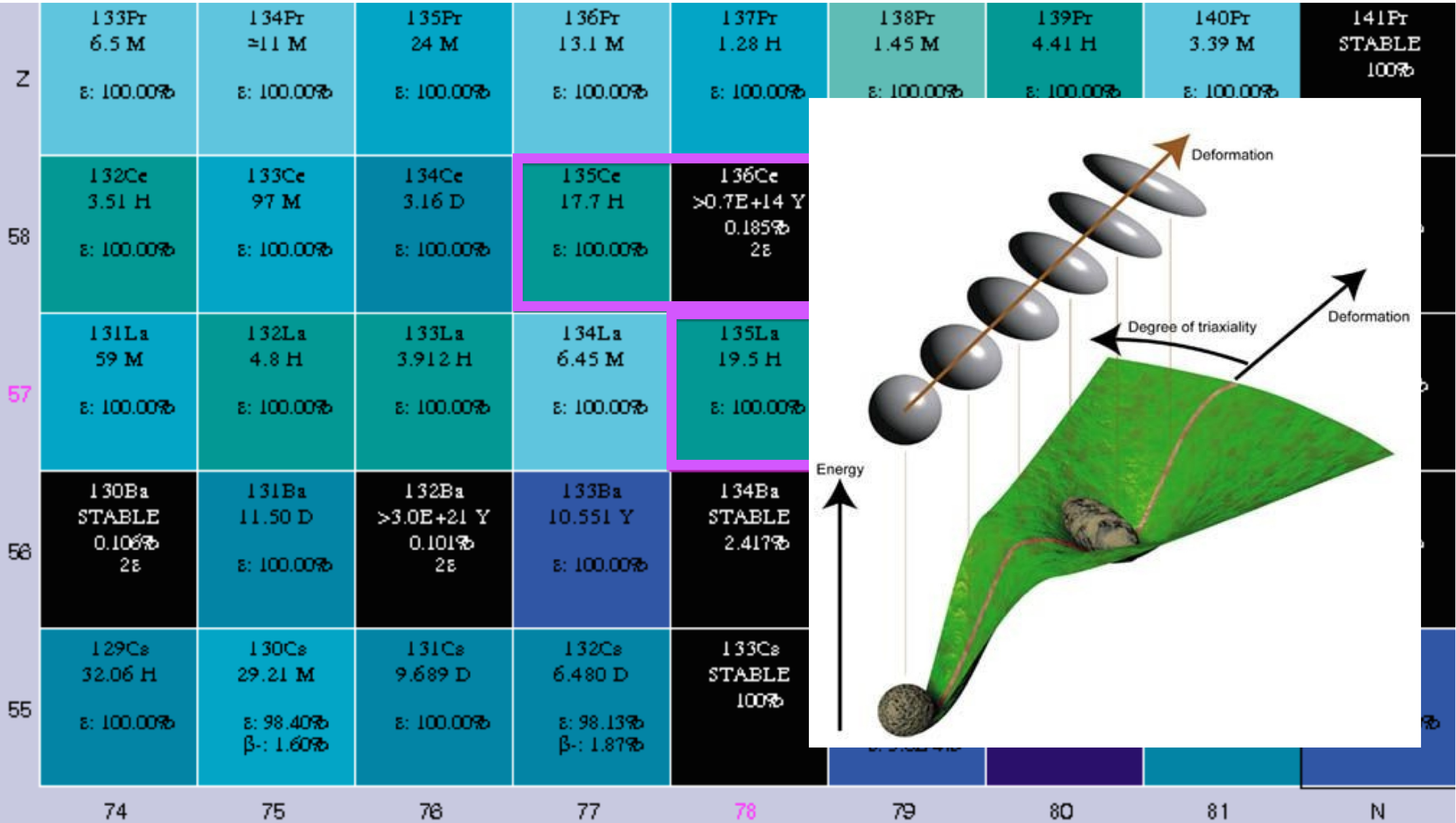
1. Introduction



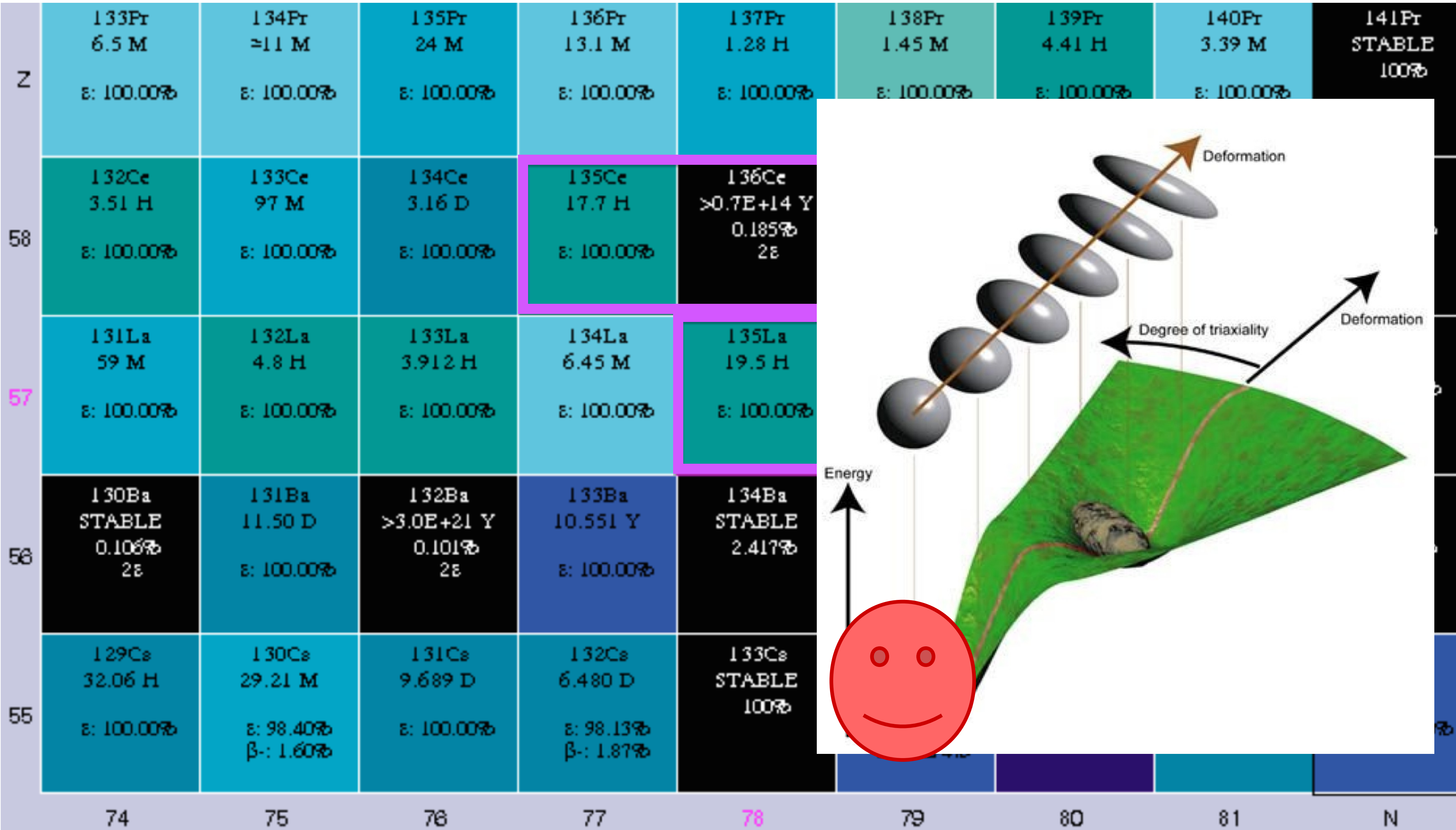
1. Introduction

Z									
Z	133Pr 6.5 M ε: 100.00%	134Pr ≈11 M ε: 100.00%	135Pr 24 M ε: 100.00%	136Pr 13.1 M ε: 100.00%	137Pr 1.28 H ε: 100.00%	138Pr 1.45 M ε: 100.00%	139Pr 4.41 H ε: 100.00%	140Pr 3.39 M ε: 100.00%	141Pr STABLE 100%
58	132Ce 3.51 H ε: 100.00%	133Ce 97 M ε: 100.00%	134Ce 3.16 D ε: 100.00%	135Ce 17.7 H ε: 100.00%	136Ce >0.7E+14 Y 0.185% 2ε	137Ce 9.0 H ε: 100.00%	138Ce ≥0.9E+14 Y 0.251% 2ε: 100.00%	139Ce 137.641 D ε: 100.00%	140Ce STABLE 88.450%
57	131La 59 M ε: 100.00%	132La 4.8 H ε: 100.00%	133La 3.912 H ε: 100.00%	134La 6.45 M ε: 100.00%	135La 19.5 H ε: 100.00%	136La 9.87 M ε: 100.00%	137La 6E+4 Y ε: 100.00%	138La 1.02E+11 Y 0.08881% ε: 65.60% β-: 34.40%	139La STABLE 99.9119%
56	130Ba STABLE 0.106% 2ε	131Ba 11.50 D ε: 100.00%	132Ba >3.0E+21 Y 0.101% 2ε	133Ba 10.551 Y ε: 100.00%	134Ba STABLE 2.417%	135Ba STABLE 6.592%	136Ba STABLE 7.854%	137Ba STABLE 11.232%	138Ba STABLE 71.698%
55	129Cs 32.06 H ε: 100.00%	130Cs 29.21 M ε: 98.40% β-: 1.60%	131Cs 9.689 D ε: 100.00%	132Cs 6.480 D ε: 98.13% β-: 1.87%	133Cs STABLE 100%	134Cs 2.0652 Y β-: 100.00% ε: 3.0E-4%	135Cs 2.3E+6 Y β-: 100.00%	136Cs 13.04 D β-: 100.00%	137Cs 30.08 Y β-: 100.00%
	74	75	76	77	78	79	80	81	N

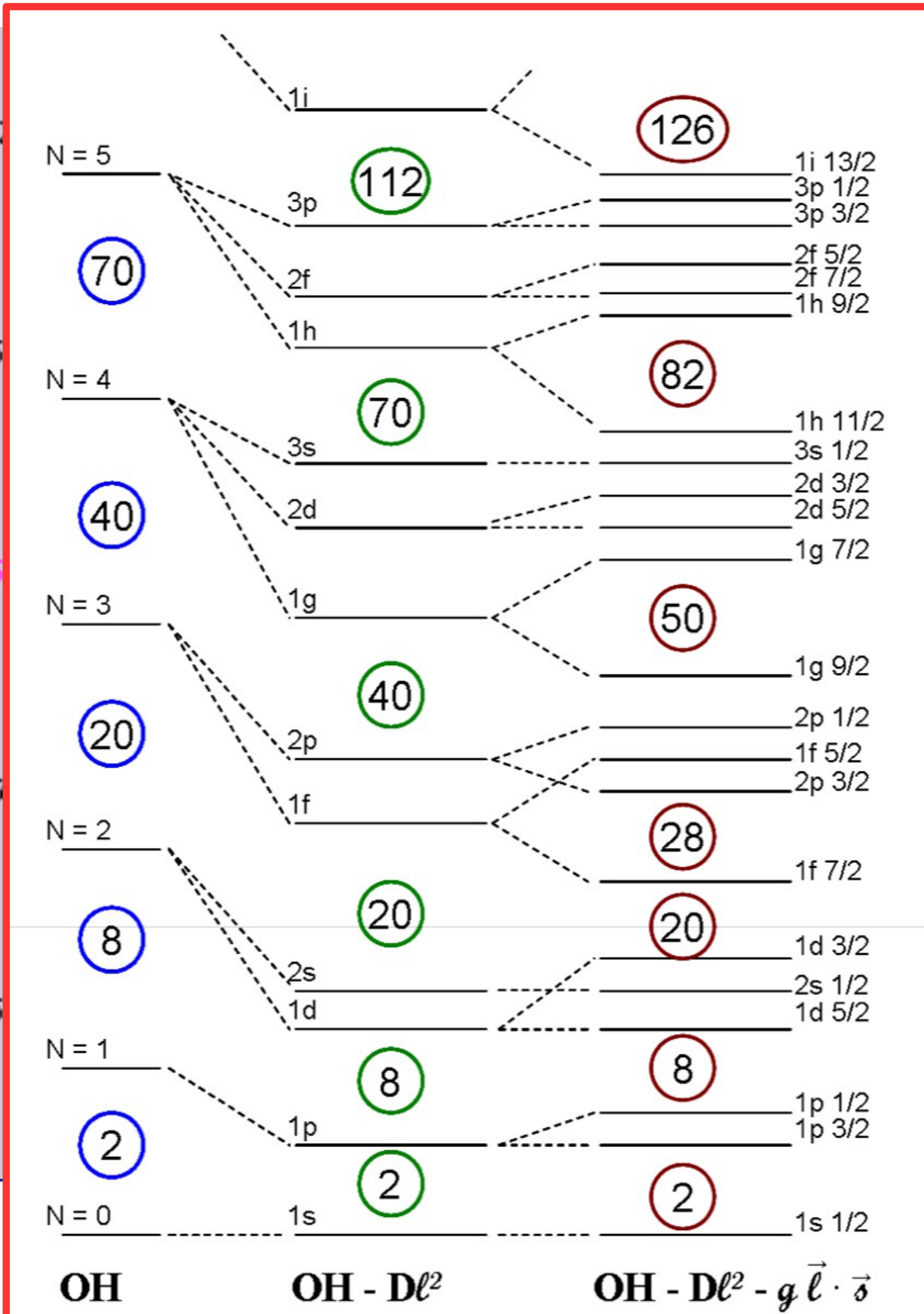
1. Introduction

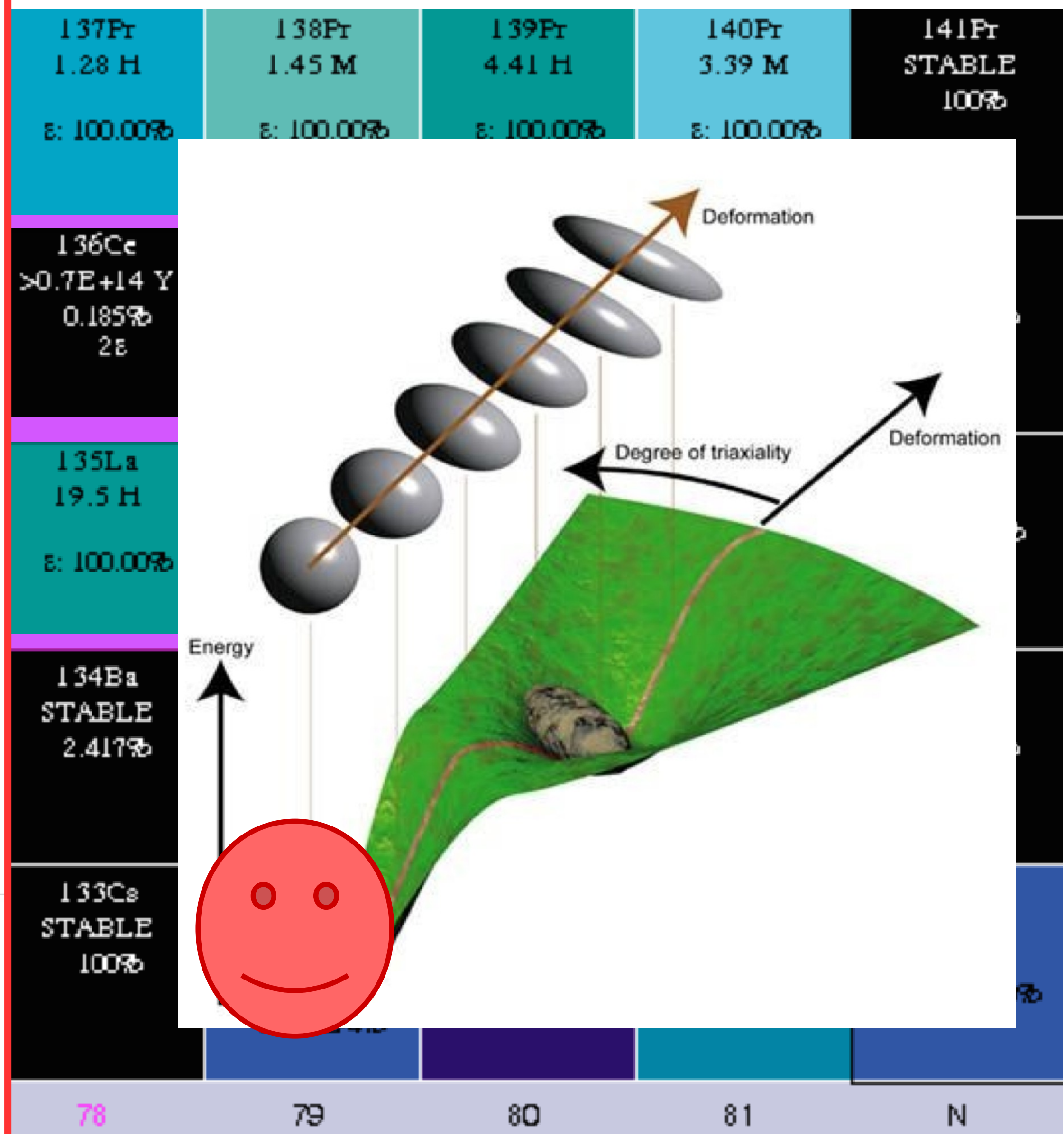


1. Introduction

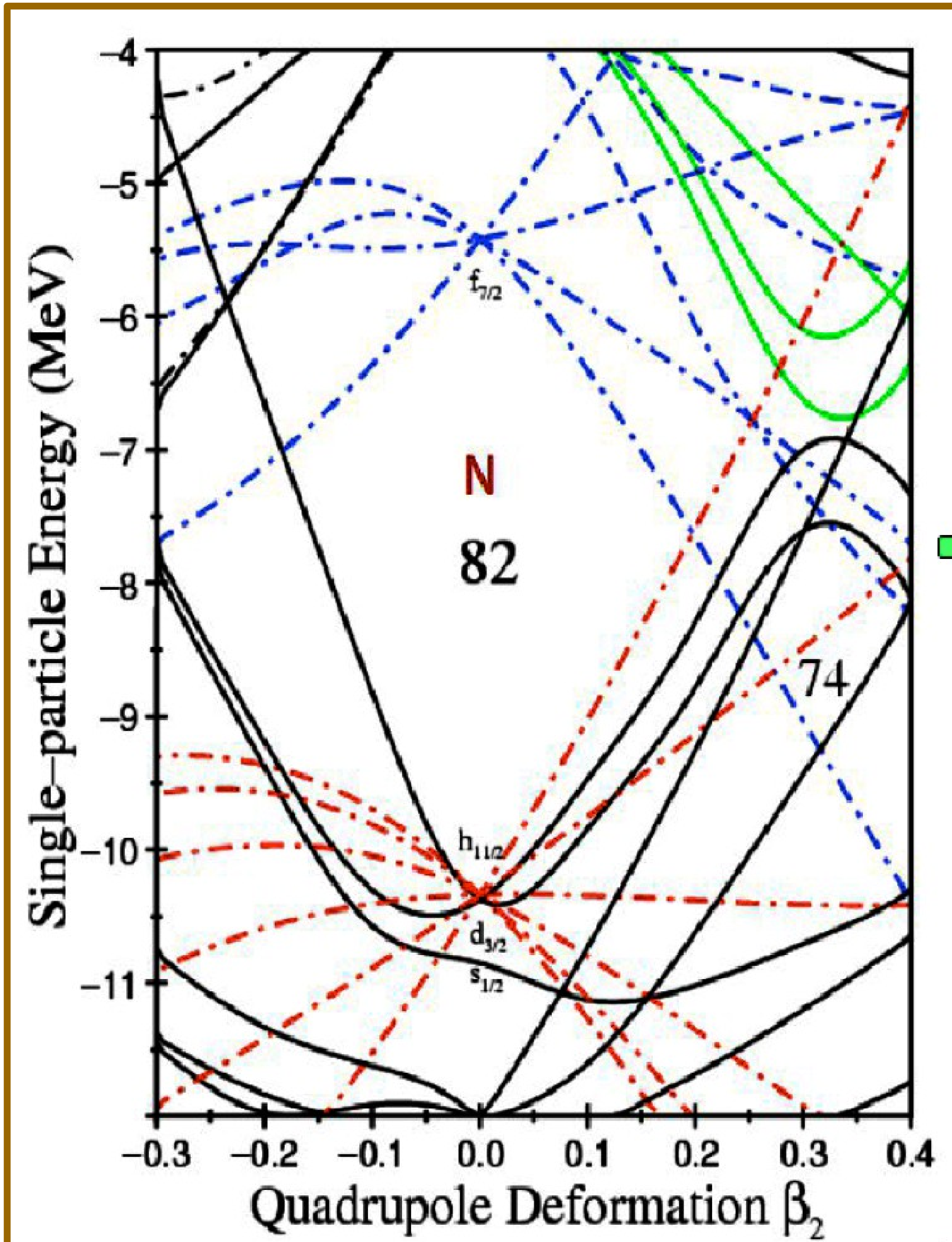


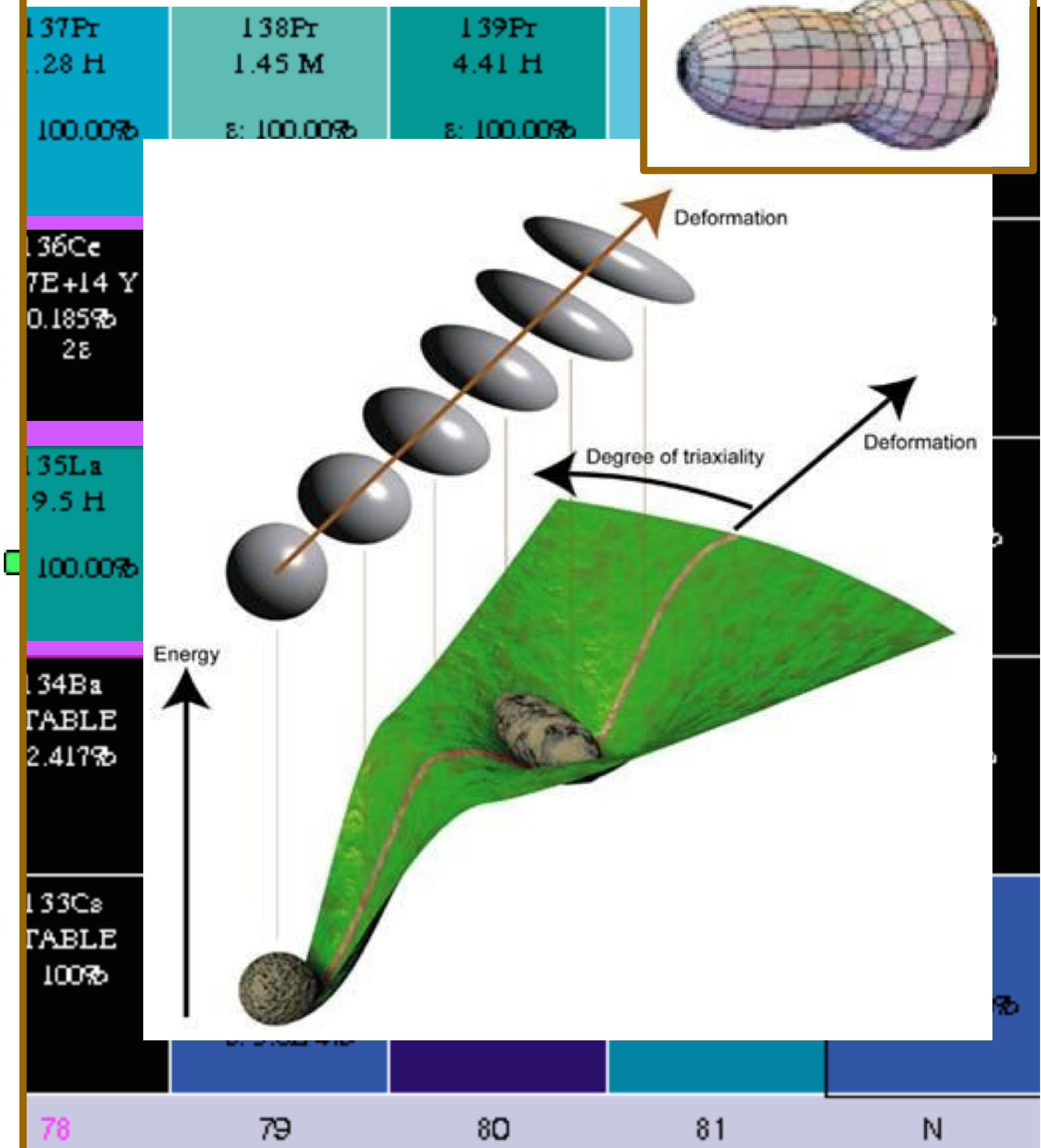
1. Introduction

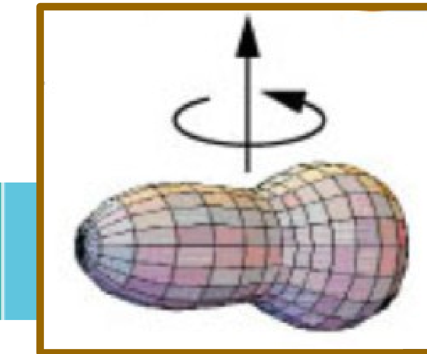




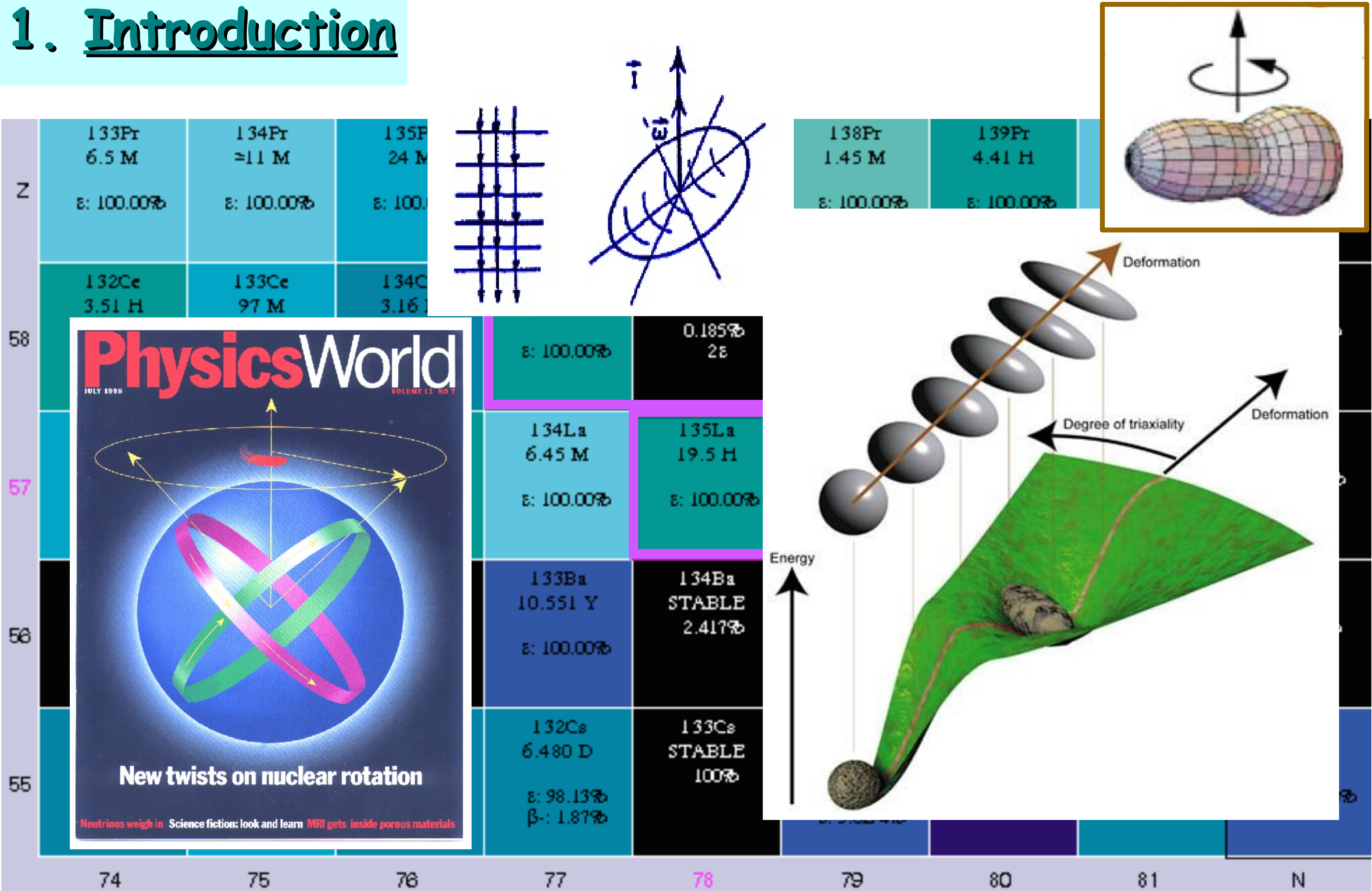
1. Introduction







1. Introduction



2. Theoretical Approach : The CNS code

CNS formalisme

"Cranked Nilsson-Strutinsky" **[Beng85, Afan99, Carls06].**

2. Theoretical Approach : The CNS code

CNS formalisme

"Cranked Nilsson-Strutinsky" **[Beng85, Afan99, Carls06].**

[**Beng85**] T. Bengtsson and I. Ragnarsson, Nucl. Phys. A 436, 14 (1985).

[**Afan99**] A. V. Afanasjev, D. B. Fossan, G. J. Lane, and I. Ragnarsson, Phys. Rep. 322, 1 (1999).

[**Carls06**] B. G. Carlsson and I. Ragnarsson, Phys. Rev. C 74, 011302(R) (2006)

2. Theoretical Approach : The CNS code

CNS formalisme

"Cranked Nilsson-Strutinsky" **[Beng85, Afan99, Carls06].**

[**Beng85**] T. Bengtsson and I. Ragnarsson, Nucl. Phys. A 436, 14 (1985).

[**Afan99**] A. V. Afanasjev, D. B. Fossan, G. J. Lane, and I. Ragnarsson, Phys. Rep. 322, 1 (1999).

[**Carls06**] B. G. Carlsson and I. Ragnarsson, Phys. Rev. C 74, 011302(R) (2006)

I. Ragnarsson (2012)

2. Theoretical Approach : The CNS code

CNS formalisme

"Cranked Nilsson-Strutinsky" [Beng85, Afan99, Carls06].

[**Beng85**] T. Bengtsson and I. Ragnarsson, Nucl. Phys. A 436, 14 (1985).

[**Afan99**] A. V. Afanasjev, D. B. Fossan, G. J. Lane, and I. Ragnarsson, Phys. Rep. 322, 1 (1999).

[**Carls06**] B. G. Carlsson and I. Ragnarsson, Phys. Rev. C 74, 011302(R) (2006)

I. Ragnarsson (2012)

My deep gratitude for the authors of CNS Codes, particularly Prof. I. Ragnarsson.

2. Theoretical Approach : The CNS code

CNS formalisme

"Cranked Nilsson-Strutinsky" [Beng85, Afan99, Carls06].

[**Beng85**] T. Bengtsson and I. Ragnarsson, Nucl. Phys. A 436, 14 (1985).

[**Afan99**] A. V. Afanasjev, D. B. Fossan, G. J. Lane, and I. Ragnarsson, Phys. Rep. 322, 1 (1999).

[**Carls06**] B. G. Carlsson and I. Ragnarsson, Phys. Rev. C 74, 011302(R) (2006)

$$E_{tot} = E_{macro} + E_{micro}$$

2. Theoretical Approach : The CNS code

CNS formalisme

"Cranked Nilsson-Strutinsky" **[Beng85, Afan99, Carls06].**

$$E_{\mathrm{tot}}(\bar{\varepsilon}, I_0) = E_{\mathrm{LD}}(\bar{\varepsilon}, I = 0) + \frac{1}{2\mathscr{J}_{\mathrm{rig}}(\bar{\varepsilon})} I_0^2 + E_{\mathrm{sh}}(\bar{\varepsilon}, I_0)$$

$(\varepsilon_2,\ \gamma,\ \varepsilon_4,\ \ldots\ )$

2. Theoretical Approach : The CNS code

CNS formalisme

"Cranked Nilsson-Strutinsky" [Beng85, Afan99, Carls06].

$$E_{\text{tot}}(\bar{\varepsilon}, I_0) = E_{\text{LD}}(\bar{\varepsilon}, I = 0) + \frac{1}{2\mathscr{J}_{\text{rig}}(\bar{\varepsilon})} I_0^2 + E_{\text{sh}}(\bar{\varepsilon}, I_0)$$

Macroscopic contribution

2. Theoretical Approach : The CNS code

CNS formalisme

"Cranked Nilsson-Strutinsky" [Beng85, Afan99, Carls06].

$$E_{\text{tot}}(\bar{\varepsilon}, I_0) = E_{\text{LD}}(\bar{\varepsilon}, I = 0) + \frac{1}{2\mathcal{J}_{\text{rig}}(\bar{\varepsilon})} I_0^2 + E_{\text{sh}}(\bar{\varepsilon}, I_0)$$

Macroscopic contribution — microscopic correction

2. Theoretical Approach : The CNS code

CNS formalisme

"Cranked Nilsson-Strutinsky" [Beng85, Afan99, Carls06].

$$E_{\text{tot}}(\bar{\varepsilon}, I_0) = E_{\text{LD}}(\bar{\varepsilon}, I = 0) + \frac{1}{2\mathscr{J}_{\text{rig}}(\bar{\varepsilon})} I_0^2 + E_{\text{sh}}(\bar{\varepsilon}, I_0)$$

Macroscopic contribution — microscopic correction

$$E_{\text{tot}}(I_0) = \sum e_i(\omega, \bar{\varepsilon})\Big|_{I=I_0} + E_{\text{LD}}(\bar{\varepsilon}, I = 0) - E_0 + \left\{\frac{1}{2J_{\text{rig}}} - \frac{1}{2J_{\text{str}}}\right\} I_0^2 - bI_0^4$$

2. Theoretical Approach : The CNS code

CNS formalisme

"Cranked Nilsson-Strutinsky" [Beng85, Afan99, Carls06].

$$E_{\text{tot}}(\bar{\varepsilon}, I_0) = E_{\text{LD}}(\bar{\varepsilon}, I = 0) + \frac{1}{2\mathscr{J}_{\text{rig}}(\bar{\varepsilon})} I_0^2 + E_{\text{sh}}(\bar{\varepsilon}, I_0)$$

Macroscopic contribution

microscopic correction

$$E_{\text{tot}}(I_0) = \sum e_i(\omega, \bar{\varepsilon})\Big|_{I=I_0} + E_{\text{LD}}(\bar{\varepsilon}, I = 0) - E_0 + \left\{\frac{1}{2J_{\text{rig}}} - \frac{1}{2J_{\text{str}}}\right\} I_0^2 - bI_0^4$$

2. Theoretical Calculation : The CNS code

2. Theoretical Calculation : The CNS code

^{132}Sn +

6, 7 and 8π → $\{1g_{7/2}, 2d_{5/2}$ and $1h_{11/2}\}$
-5, -4 and -3ν → $\{2d_{3/2}, 3s_{1/2}, 2f_{7/2}, 1h_{9/2}, 1h_{11/2}$ and $1i_{13/2}\}$

2. Theoretical Calculation : The CNS code

^{132}Sn +

6, 7 and 8π → {$1g_{7/2}$, $2d_{5/2}$ and $1h_{11/2}$}
-5, -4 and -3ν → {$2d_{3/2}$, $3s_{1/2}$, $2f_{7/2}$, $1h_{9/2}$, $1h_{11/2}$ and $1i_{13/2}$}

$$\pi\left[(d_{5/2}g_{7/2})^{p_1}_{\alpha_1}(h_{11/2})^{p_2}_{\alpha_2}\right]\otimes\nu\left[(d_{3/2}s_{1/2})^{-n_1}_{\alpha_3}(h_{11/2})^{-n_2}_{\alpha_4}(h_{9/2}f_{7/2})^{n_3}_{\alpha_5}(i_{13/2})^{n_4}_{\alpha_6}\right]$$

2. Theoretical Calculation : The CNS code

^{132}Sn +

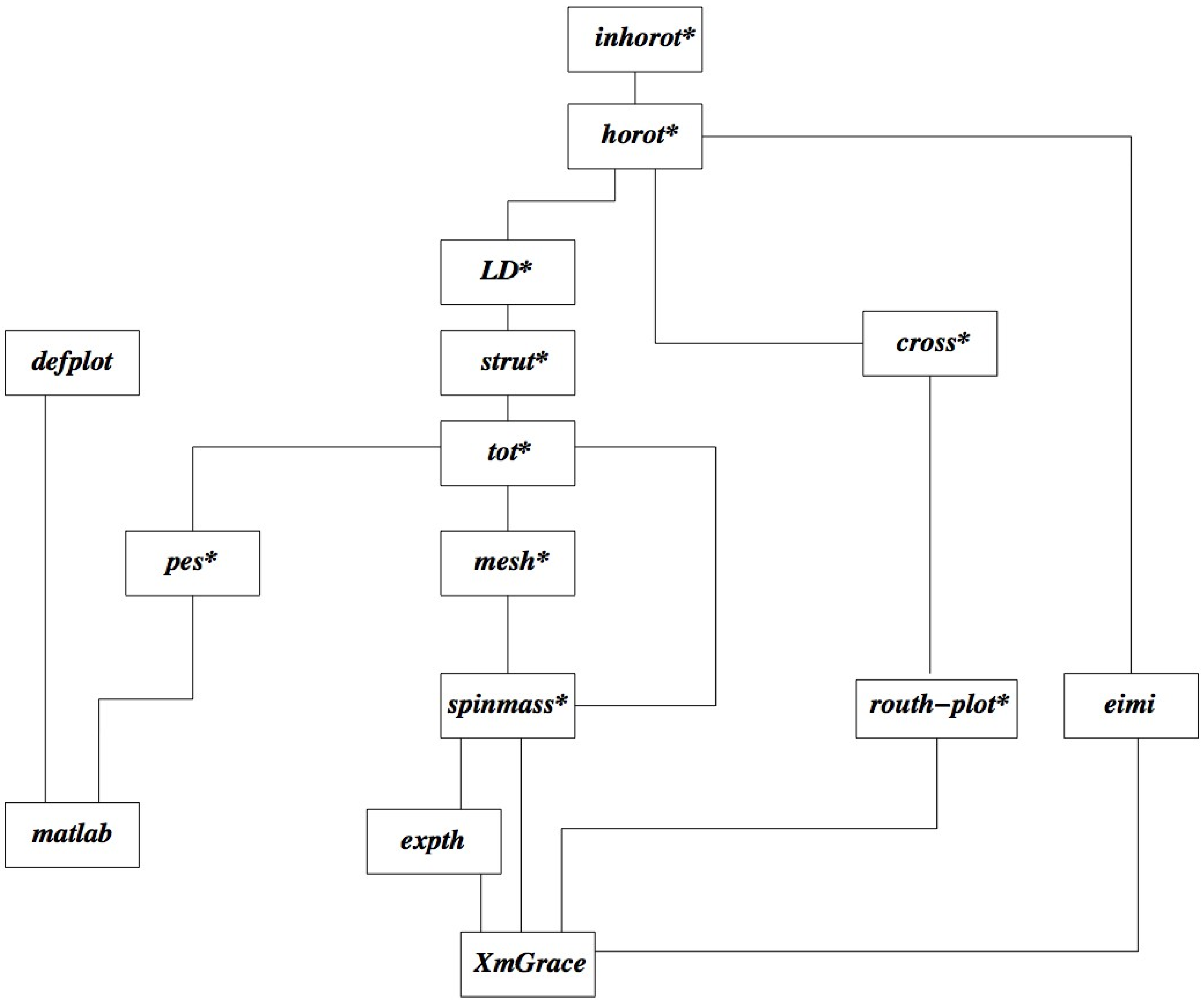
6, 7 and 8π $\rightarrow \{1g_{7/2}, 2d_{5/2}$ and $1h_{11/2}\}$

-5, -4 and -3ν $\rightarrow \{2d_{3/2}, 3s_{1/2}, 2f_{7/2}, 1h_{9/2}, 1h_{11/2}$ and $1i_{13/2}\}$

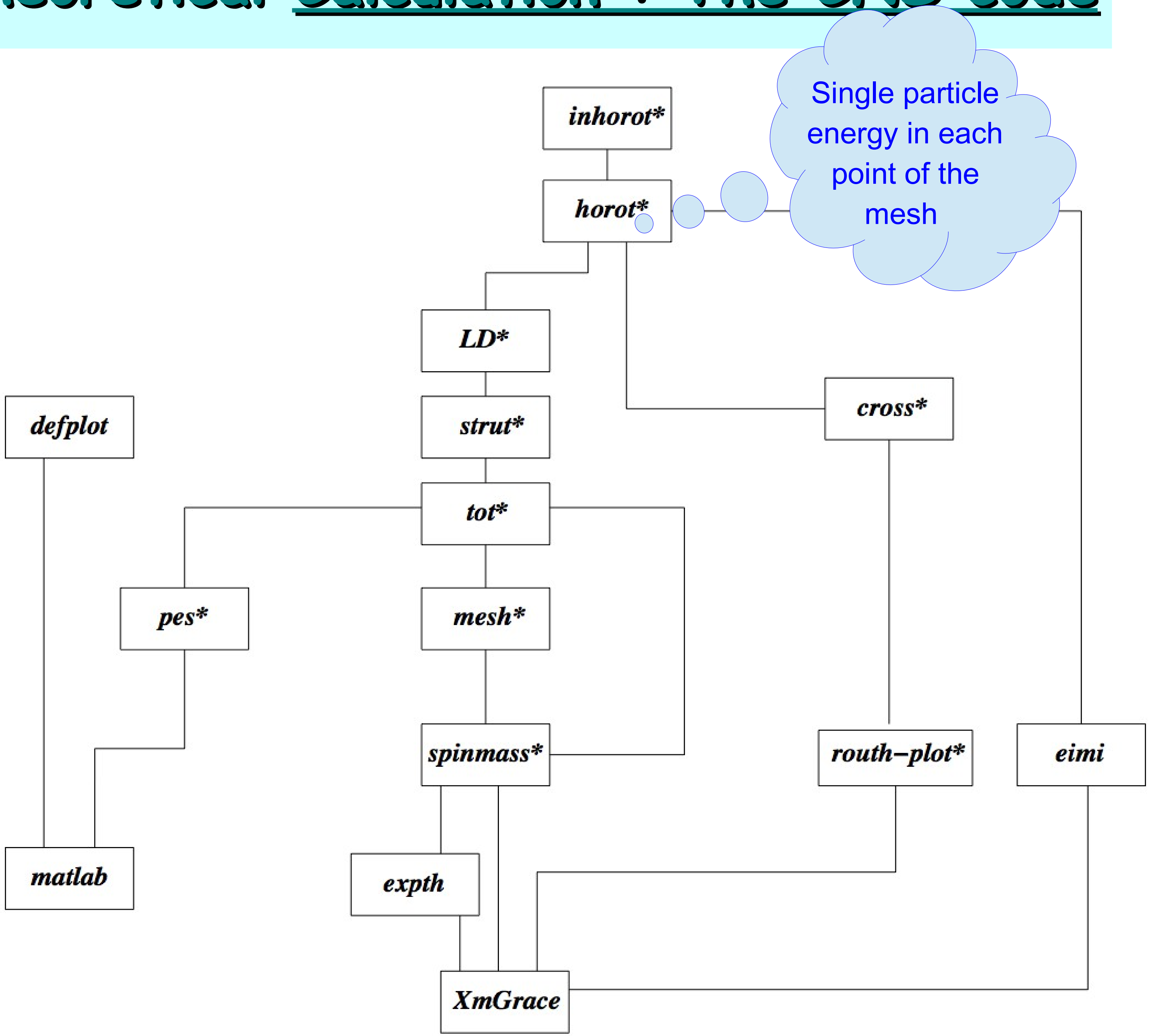
$$\pi\left[(d_{5/2}g_{7/2})^{p_1}_{\alpha_1}(h_{11/2})^{p_2}_{\alpha_2}\right]\otimes\nu\left[(d_{3/2}s_{1/2})^{-n_1}_{\alpha_3}(h_{11/2})^{-n_2}_{\alpha_4}(h_{9/2}f_{7/2})^{n_3}_{\alpha_5}(i_{13/2})^{n_4}_{\alpha_6}\right]$$

$$\left[p_1p_2, n_1n_2\,(n_3n_4)\right]$$

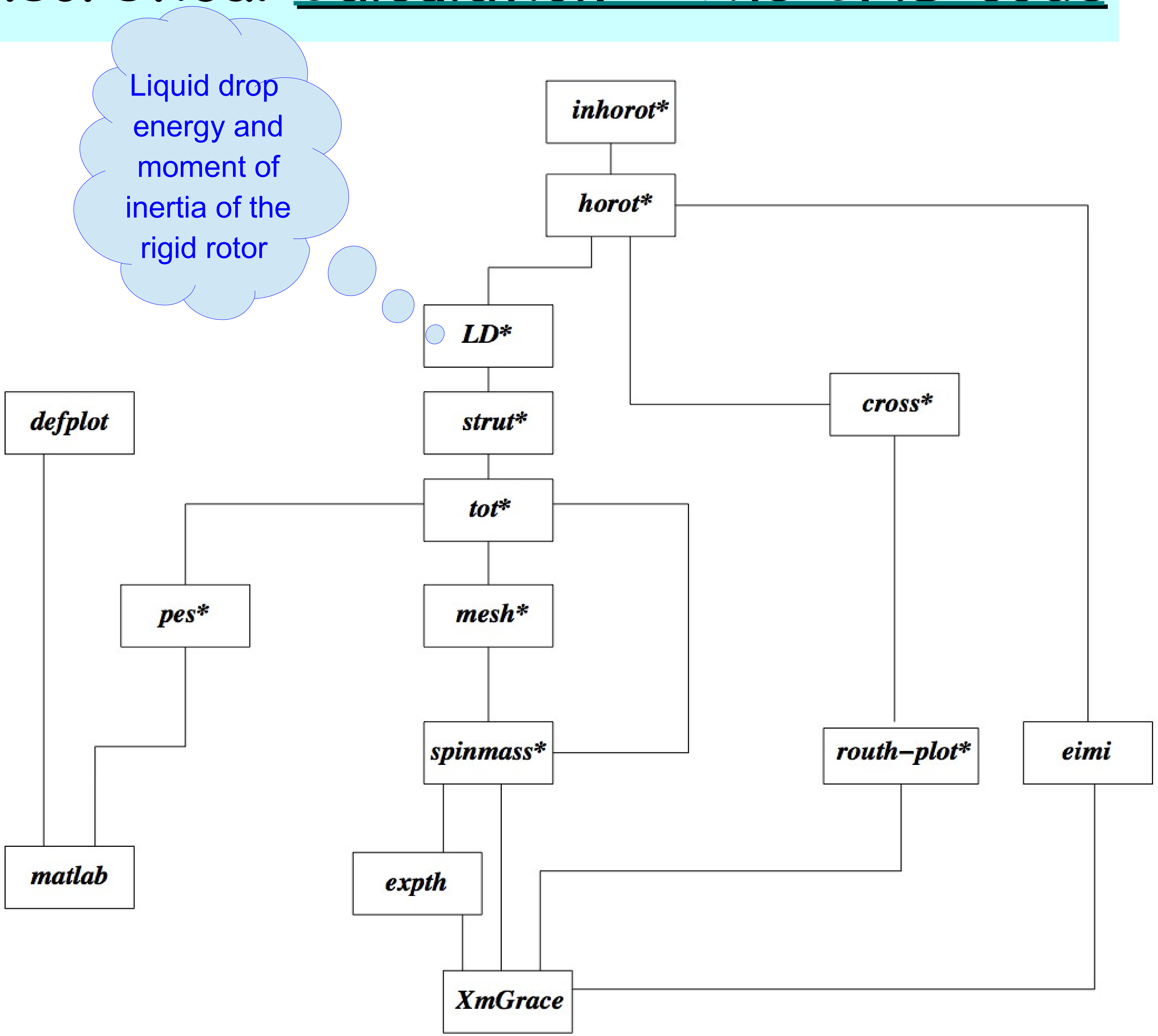
2. Theoretical Calculation : The CNS code



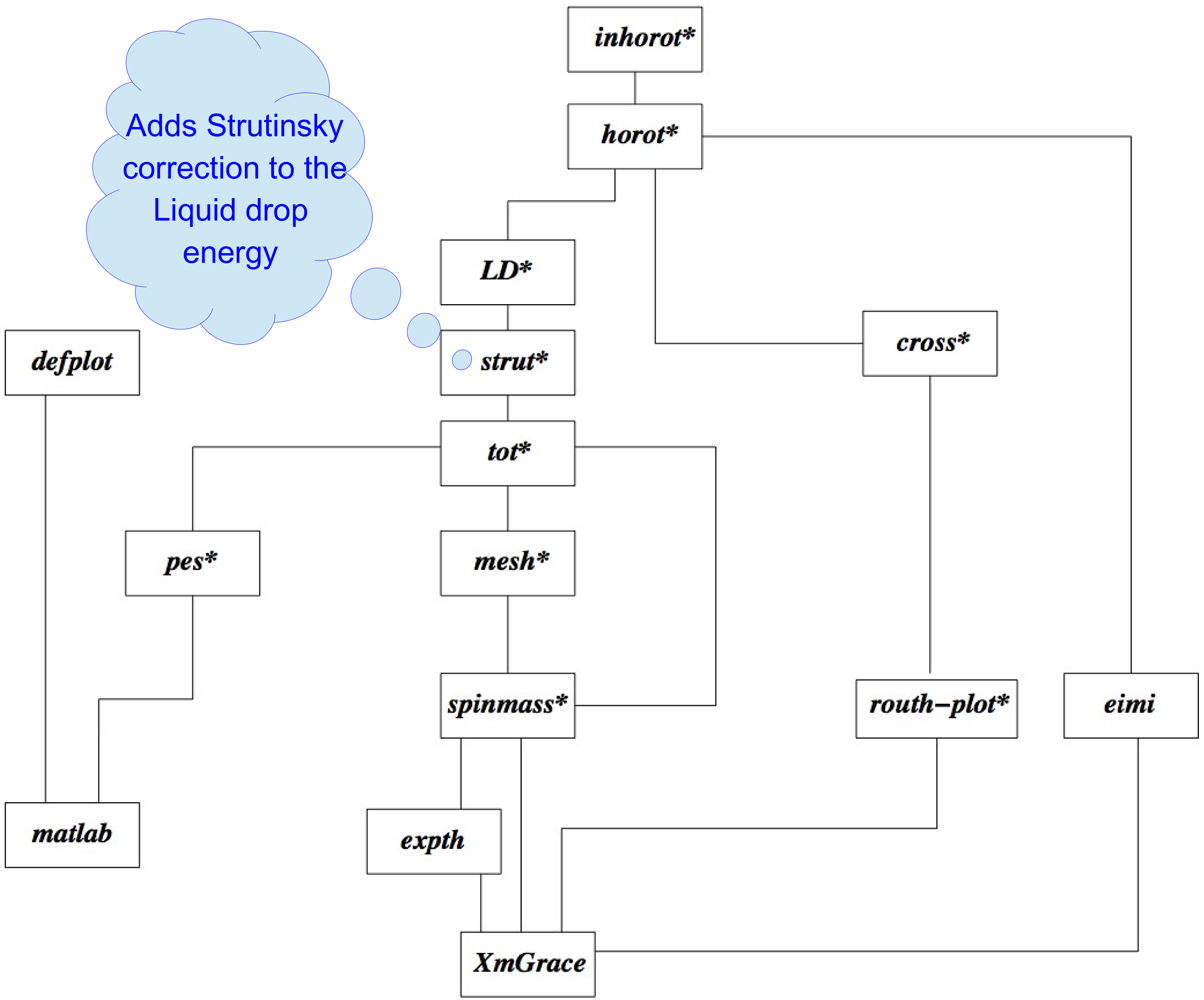
2. Theoretical Calculation : The CNS code



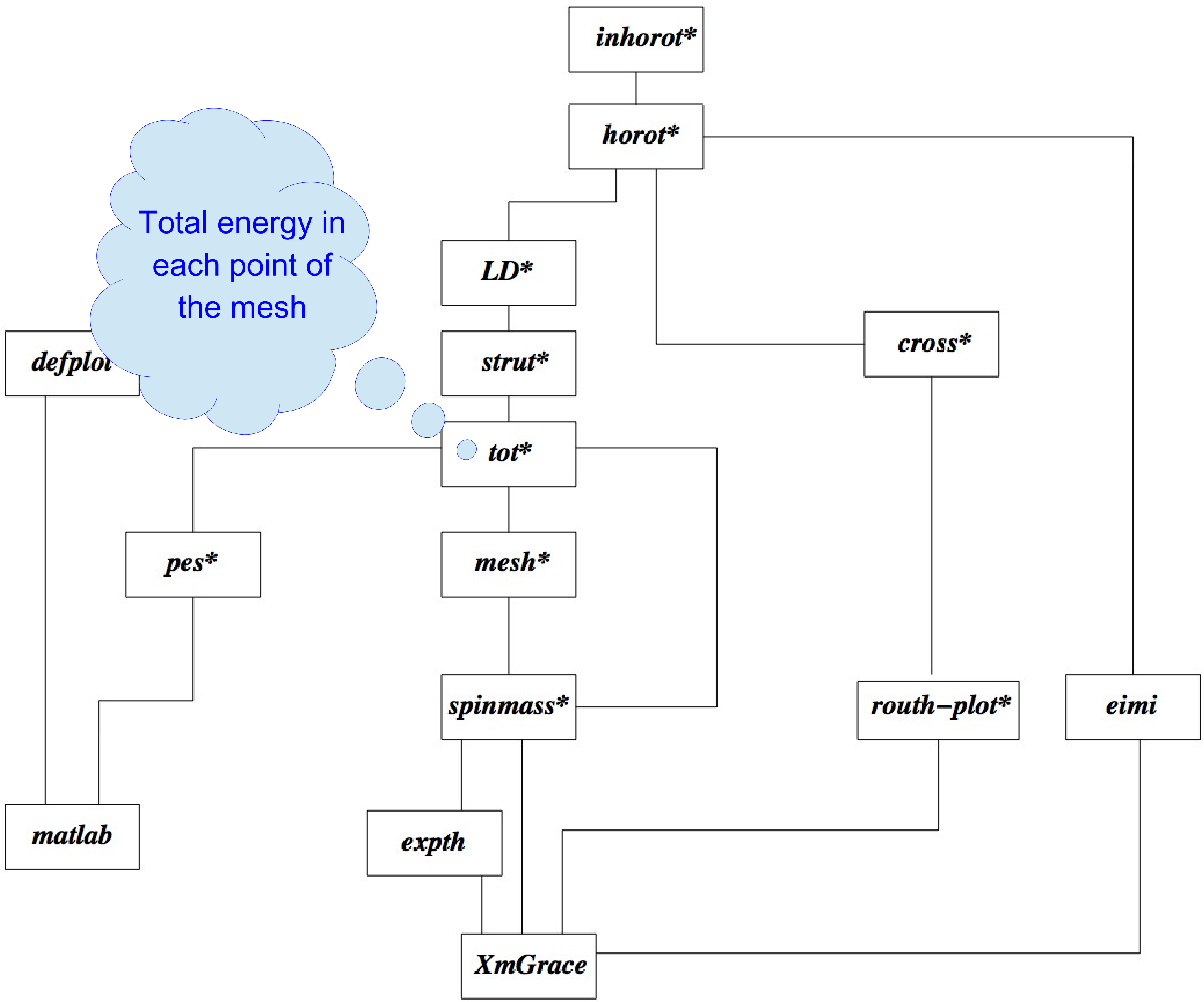
2. Theoretical Calculation : The CNS code



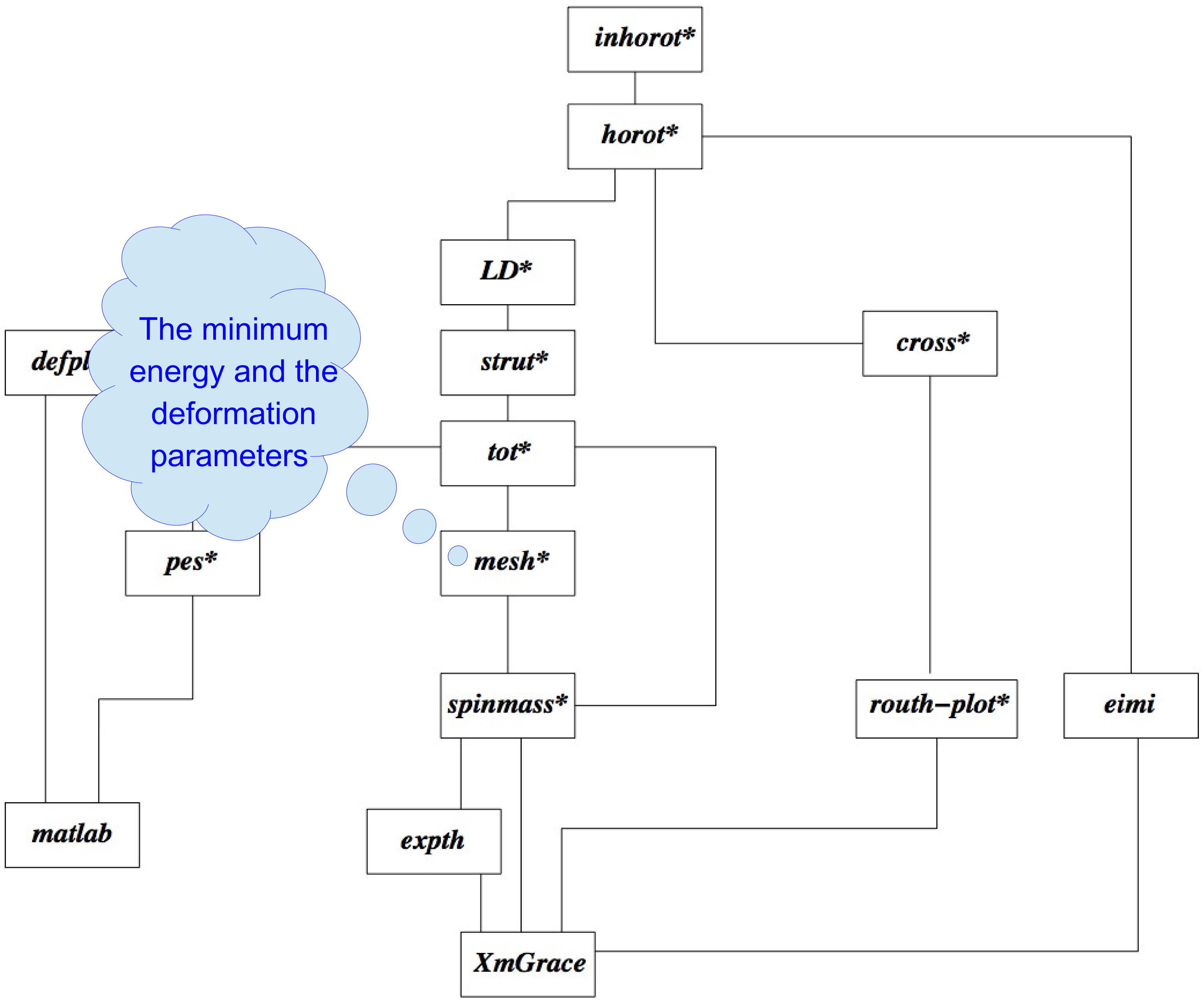
2. Theoretical Calculation : The CNS code



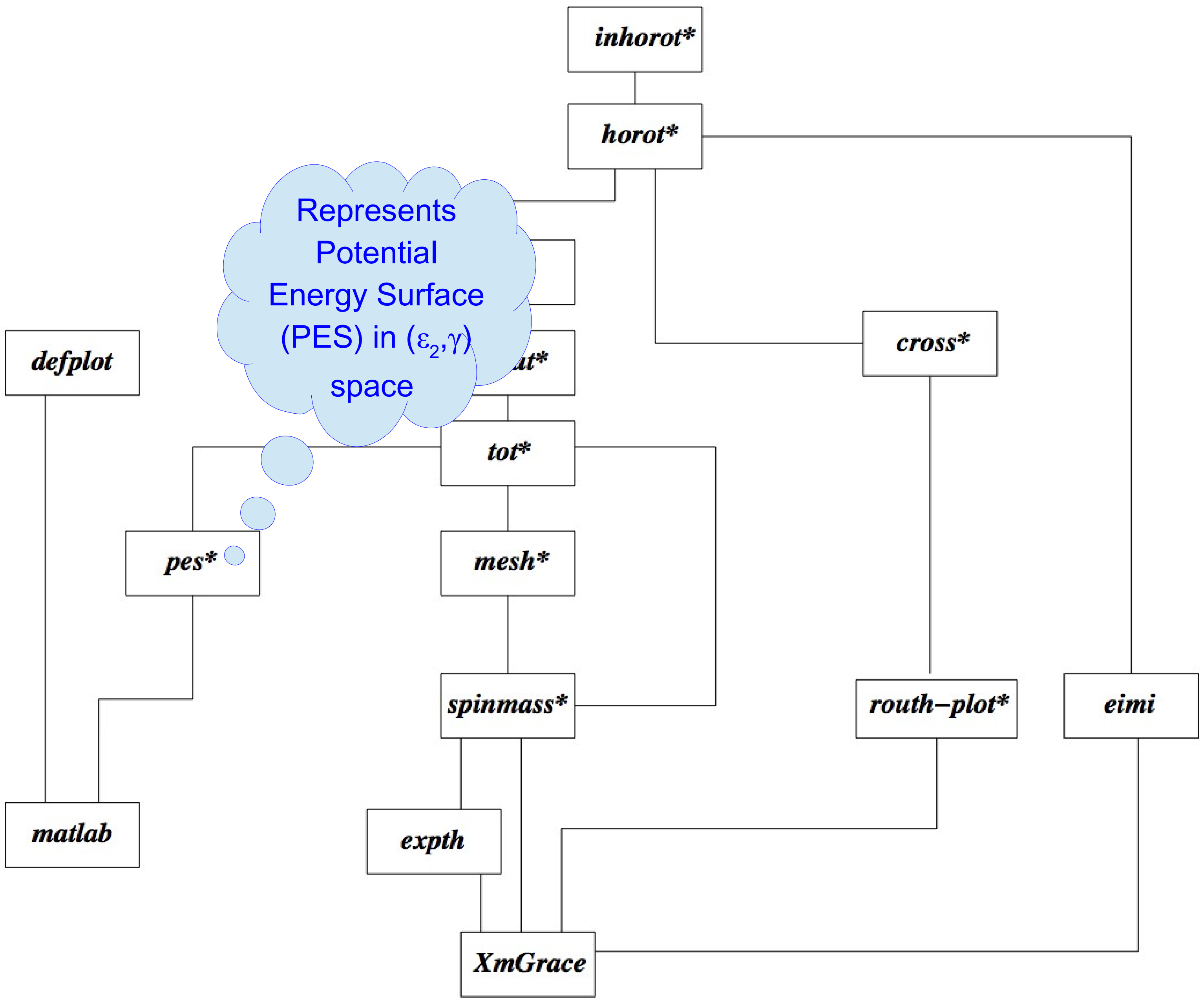
2. Theoretical Calculation : The CNS code



2. Theoretical Calculation : The CNS code



2. Theoretical Calculation : The CNS code



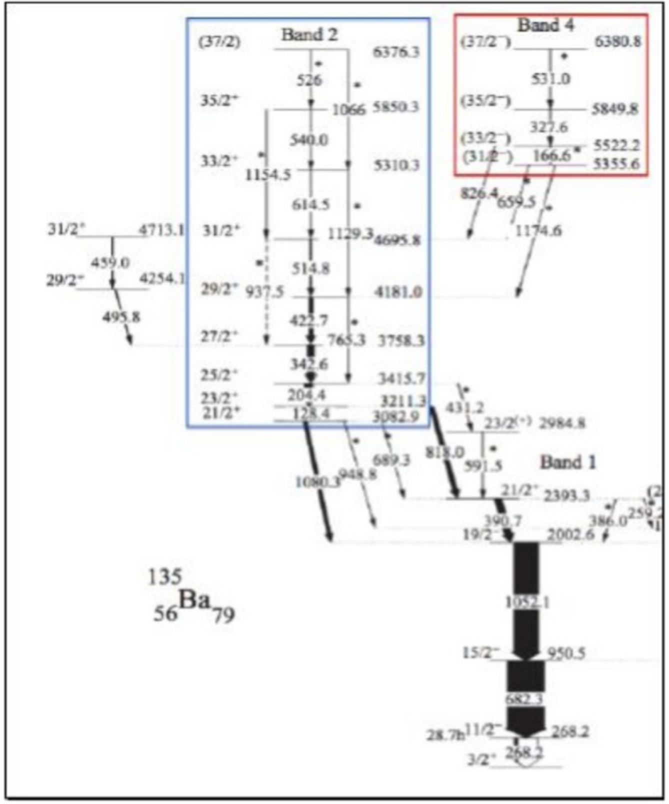
3. Results and Discussion

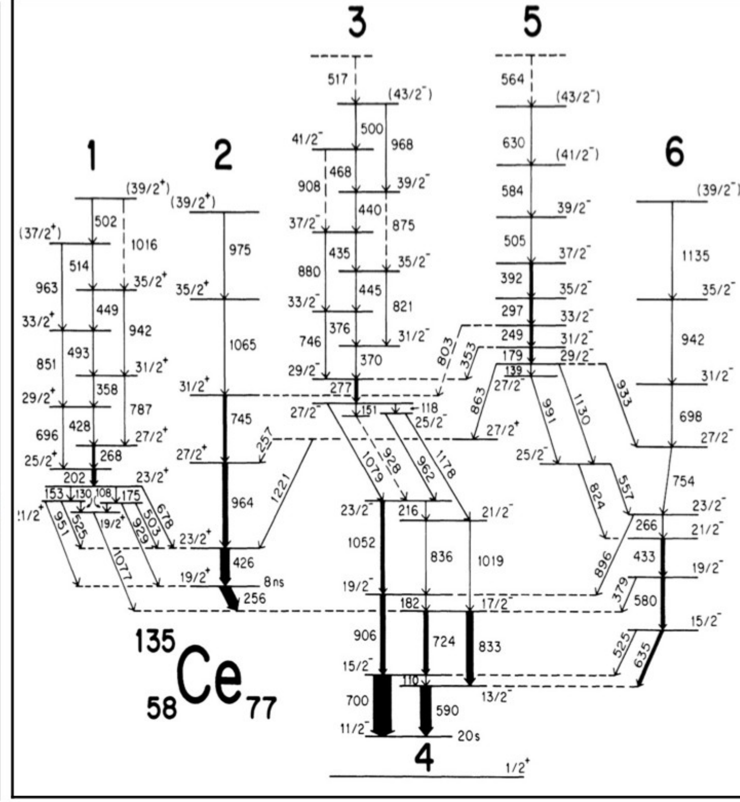
^{135}Ba

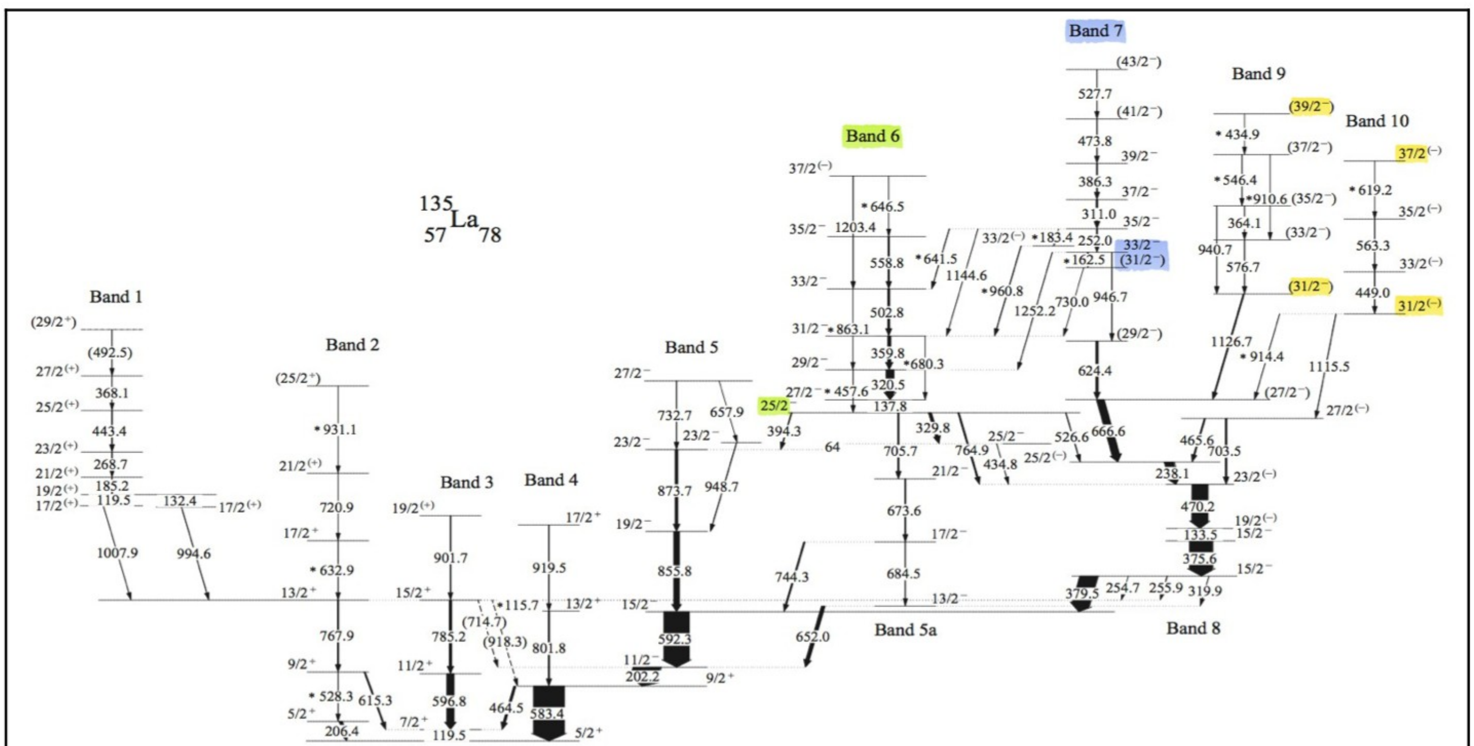
^{135}La

^{135}Ce

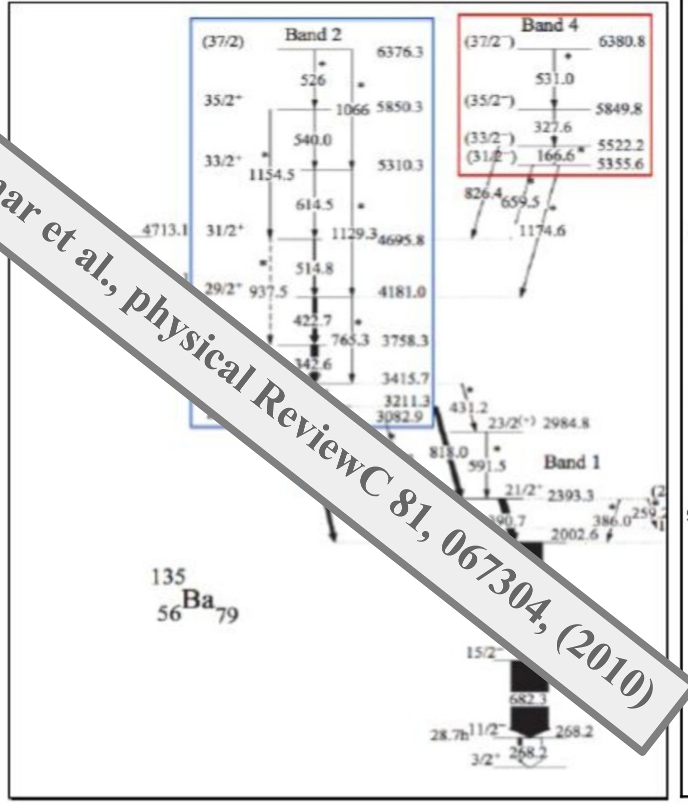
3. Resu


Band 2
Band 4
Band 1
$^{135}_{56}Ba_{79}$

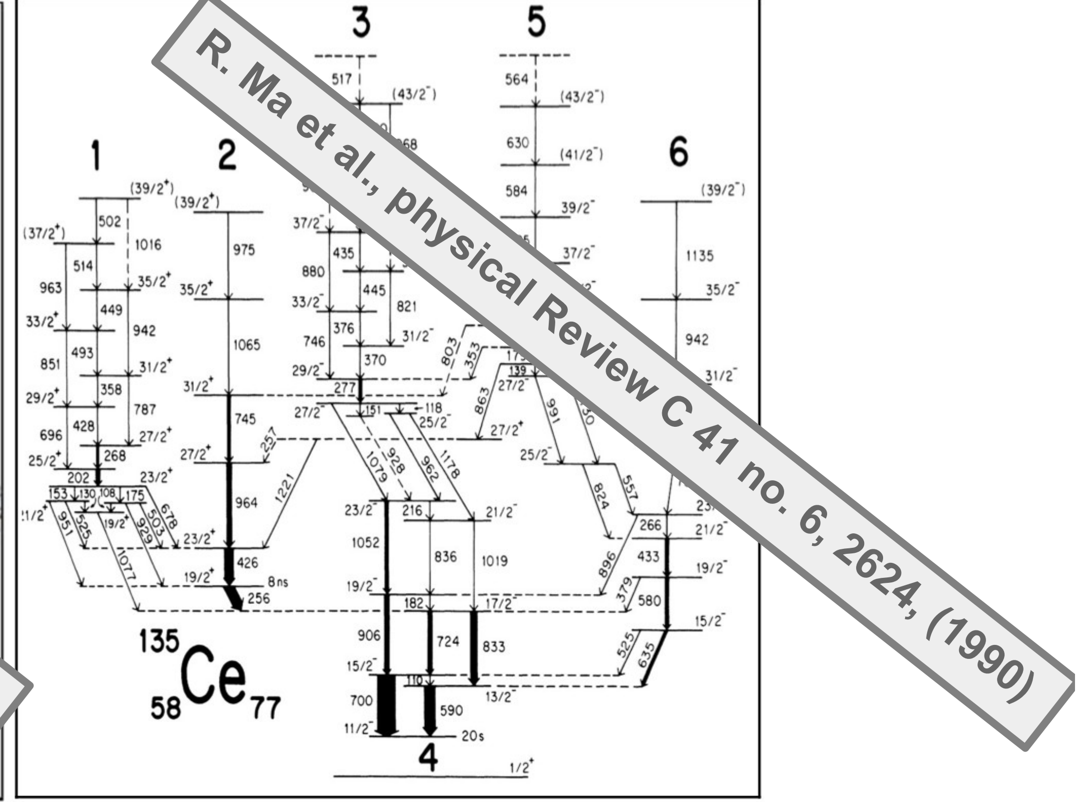

1
2
3
4
5
6
$^{135}_{58}Ce_{77}$


$^{135}_{57}La_{78}$
Band 1
Band 2
Band 3
Band 4
Band 5
Band 5a
Band 6
Band 7
Band 8
Band 9
Band 10

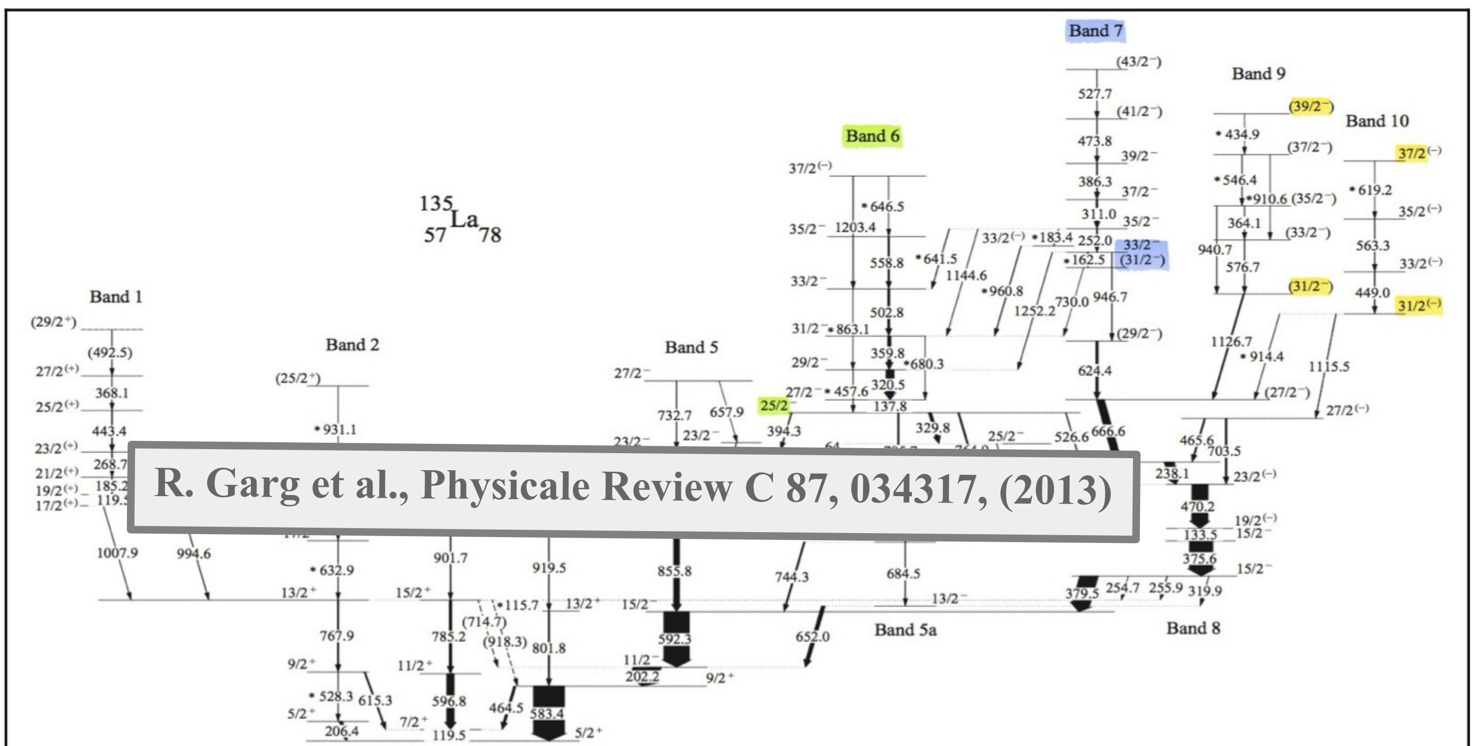
3. Resu



S. Kumar et al., physical ReviewC 81, 067304, (2010)
Band 2
Band 4
Band 1
135 56 Ba 79

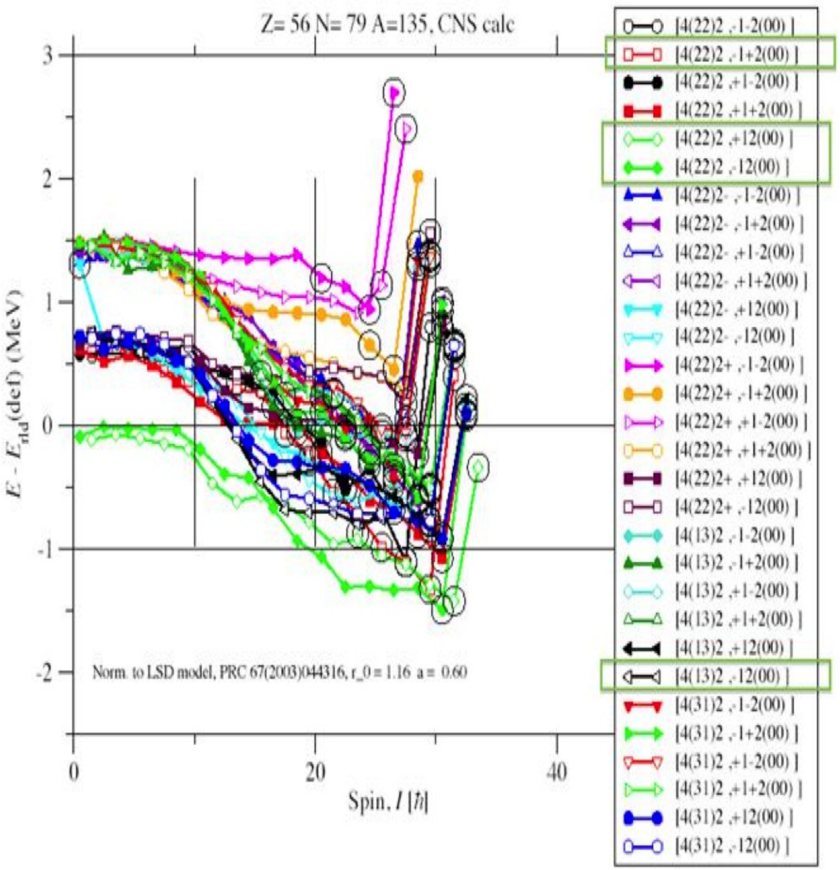


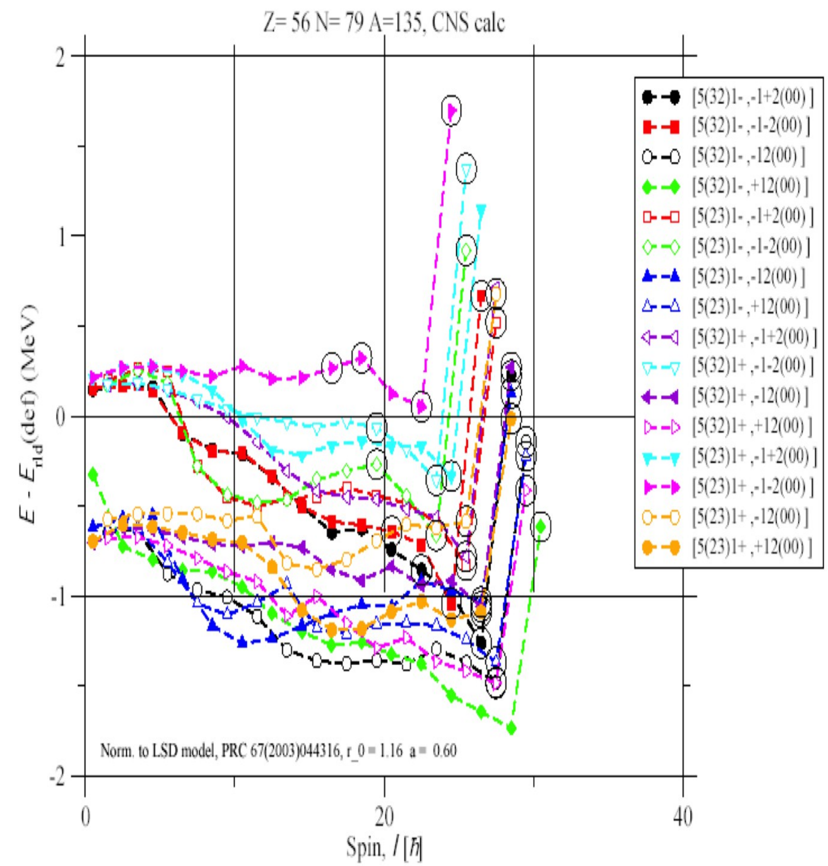
R. Ma et al., physical Review C 41 no. 6, 2624, (1990)
135 58 Ce 77
1
2
3
4
5
6



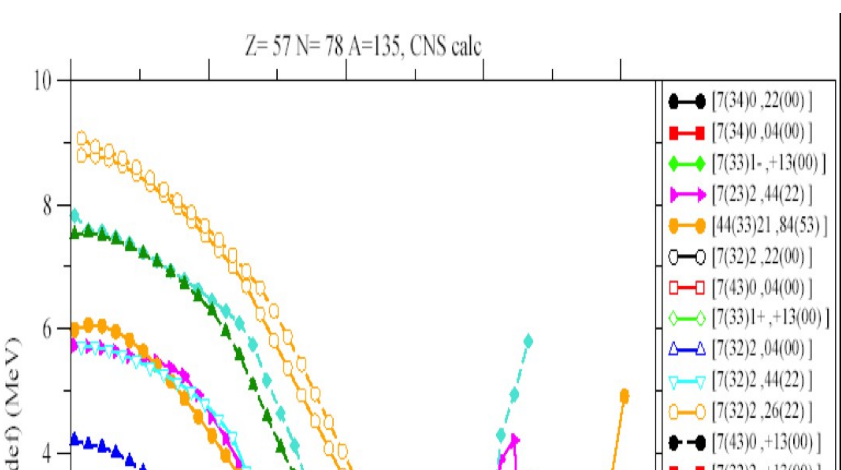
R. Garg et al., Physicale Review C 87, 034317, (2013)
135 57 La 78
Band 1
Band 2
Band 5
Band 5a
Band 6
Band 7
Band 8
Band 9
Band 10

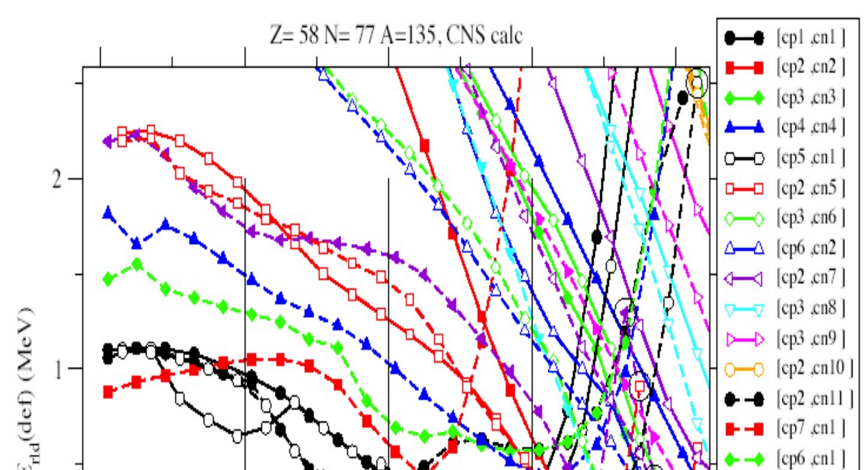
3. Results and Discussion





S



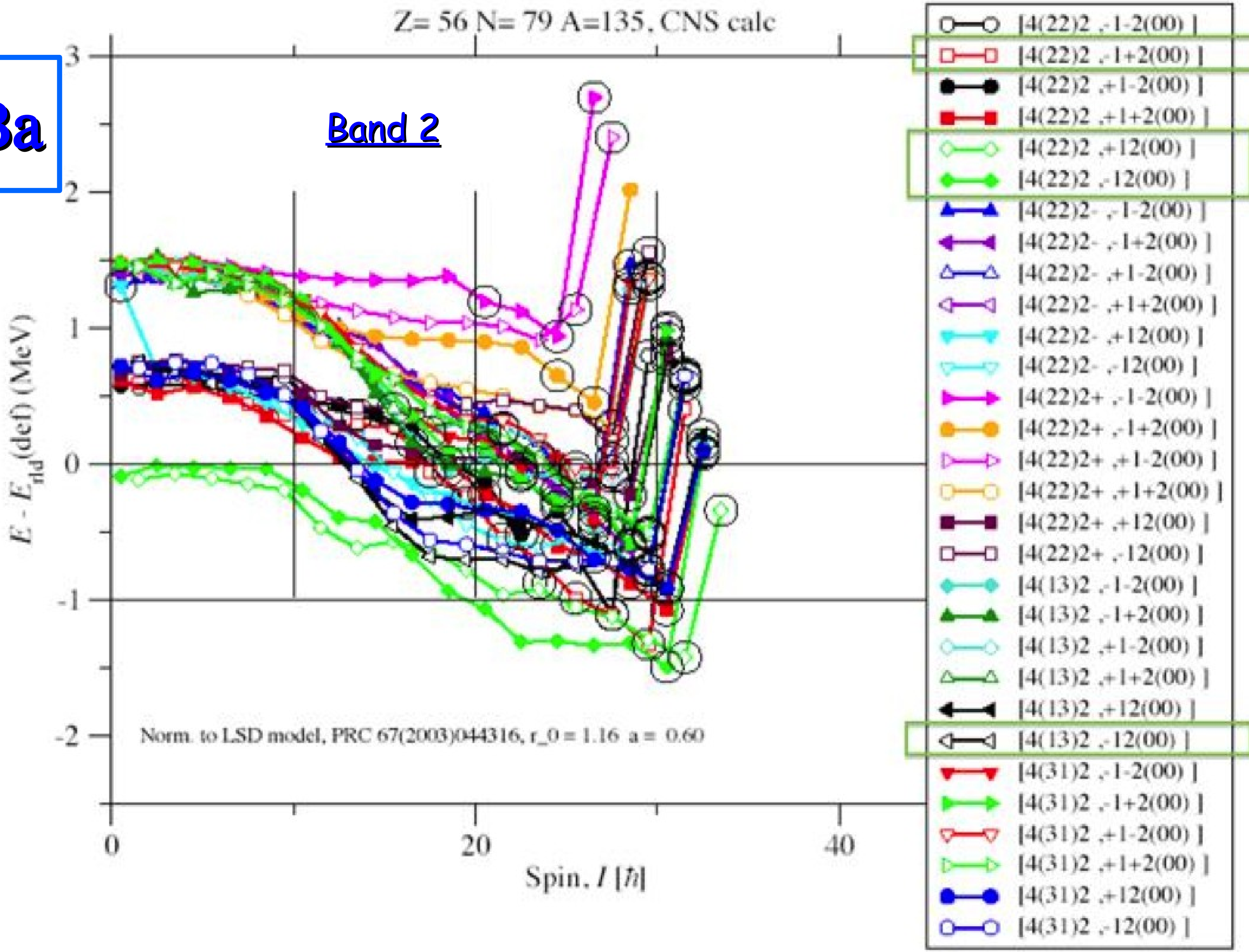


8

3.

^{135}Ba

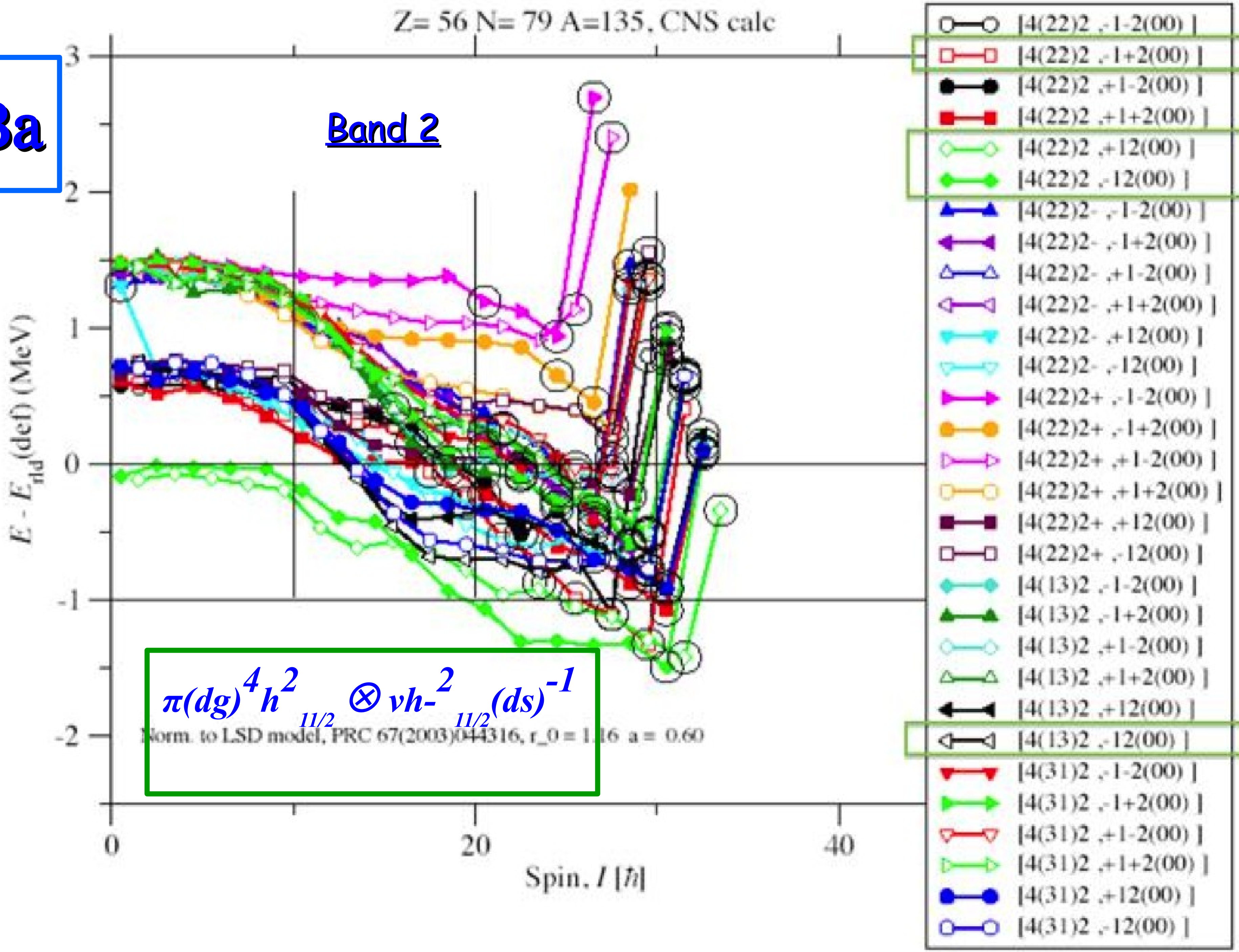
Band 2



3.

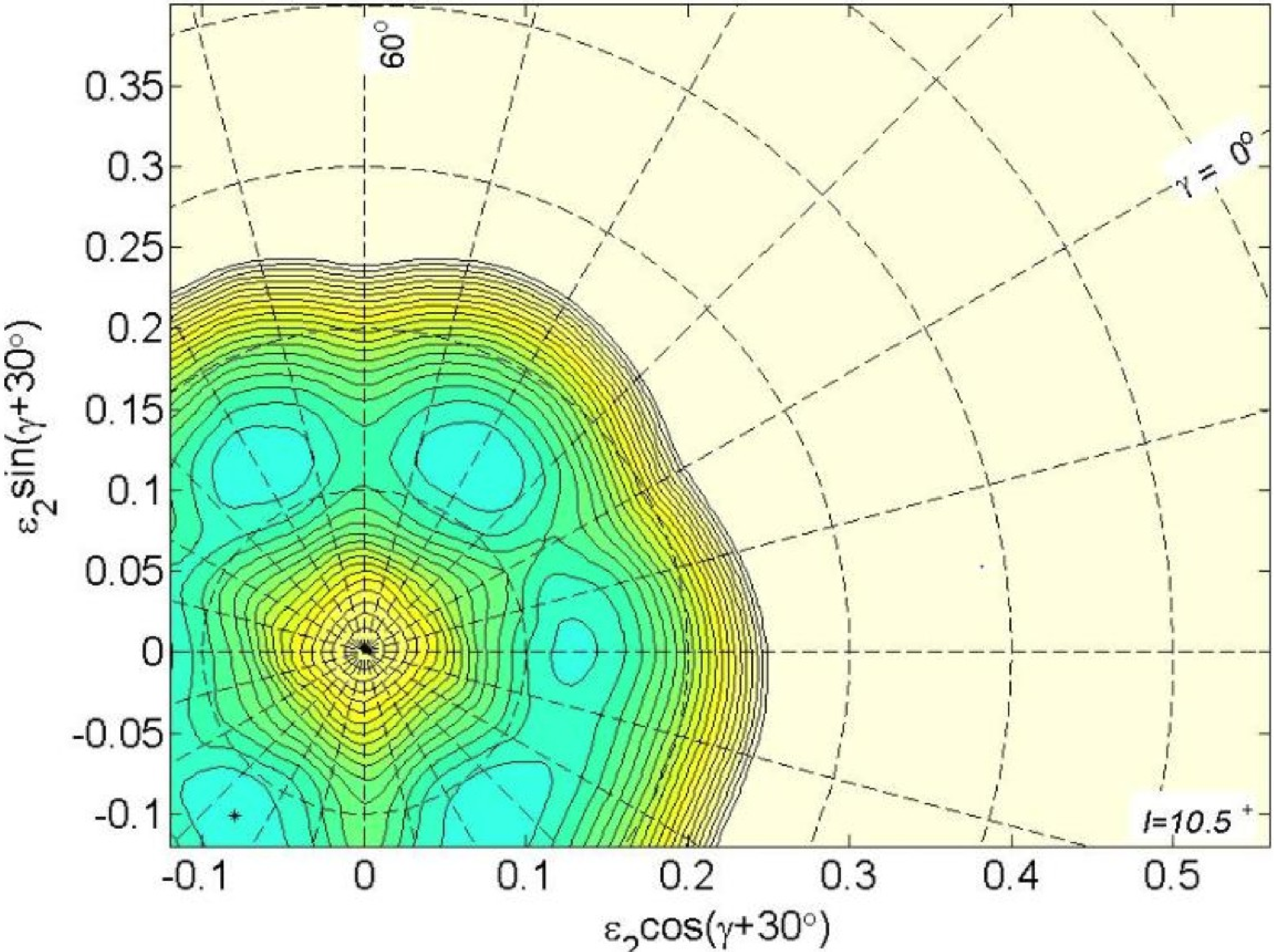
^{135}Ba

Band 2

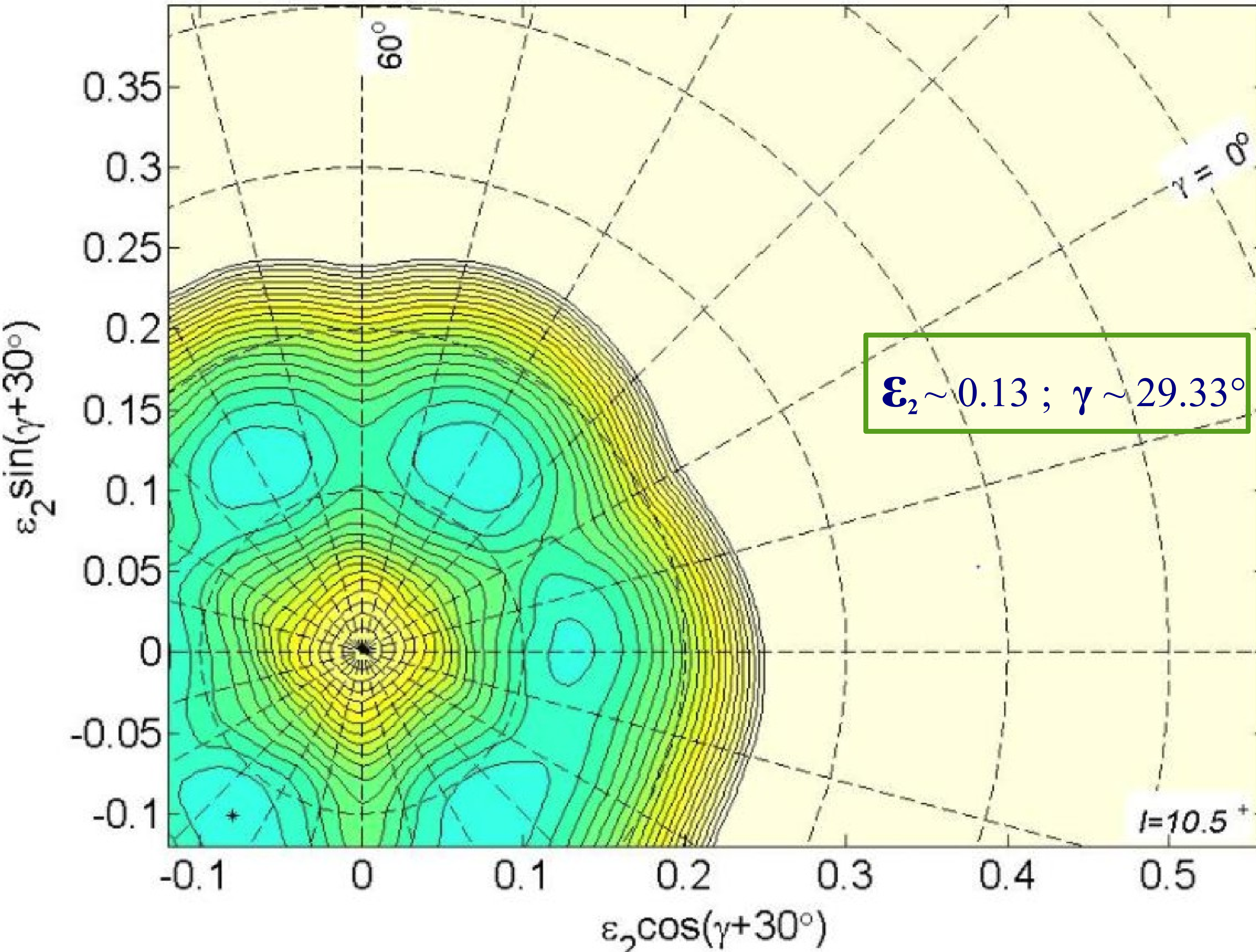


$\pi(dg)^4 h^2_{11/2} \otimes \nu h^{-2}_{11/2}(ds)^{-1}$

3 Results and Discussion



3. Results and Discussion



3 Results and Discussion

Nuclei	Bands	Configurations	ε_2	$\gamma°$
$^{135}_{56}Ba$	Band2	$\pi(dg)^4h^2_{11/2} \otimes \nu(ds)^{-1}h^{-2}_{11/2}$	0.13	29,33
	Band4	$\pi(dg)^5h^1_{11/2} \otimes \nu(ds)^{-1}h^{-2}_{11/2}$	0.11	16,76
$^{135}_{57}La$	Band1	$\pi(dg)^7 \otimes \nu(ds)^{-2}h^{-2}_{11/2}$	0.14	31,7
	Band2	$\pi(dg)^5h^2_{11/2} \otimes \nu(ds)^{-2}h^{-2}_{11/2}$	0.27	-35.06
	Band5	$\pi(dg)^7 \otimes \nu(ds)^{-1}h^{-3}_{11/2}$	0.13	-10.584
	Band6	$\pi(dg)^6 h^1_{11/2} \otimes \nu h^{-4}_{11/2}$	0.13	5,09
	Band7	$\pi(dg)^5 h^2_{11/2} \otimes \nu(ds)^{-1}h^{-3}_{11/2}$	0.14	5,26
	Band9	$\pi(dg)^7 \otimes \nu h^{-4}_{11/2}$	0.09	-14.55
	Band10	$\pi(dg)^6 h^1_{11/2} \otimes \nu(ds)^{-1}h^{-3}_{11/2}$	0.12	-23.99
$^{135}_{58}Ce$	Band2	$\pi(dg)^7h^1_{11/2} \otimes \nu(ds)^{-2}h^{-3}_{11/2}$	0.16	26,7
	Band3	$\pi(dg)^6h^2_{11/2} \otimes \nu(ds)^{-2}h^{-3}_{11/2}$	0.18	26.56
	Band5	$\pi(dg)^6h^2_{11/2} \otimes \nu(ds)^{-2}h^{-3}_{11/2}$	0.18	26.75
	Band6	$\pi(dg)^8 \otimes \nu(ds)^{-2}h^{-3}_{11/2}$	0.14	-39.48

3. Results and Discussion

Nuclei	*Bands*	*Configurations*	ε_2	$\gamma°$
$^{135}_{56}Ba$	Band2	$\pi(dg)^4h^2_{11/2}\otimes\nu(ds)^{-1}h^{-2}_{11/2}$	0.13	29,33
	Band4	$\pi(dg)^5h^1_{11/2}\otimes\nu(ds)^{-1}h^{-2}_{11/2}$	0.11	16,76
$^{135}_{57}La$	Band1	$\pi(dg)^7\otimes\nu(ds)^{-2}h^{-2}_{11/2}$	0.14	31,7
	Band2	$\pi(dg)^5h^2_{11/2}\otimes\nu(ds)^{-2}h^{-2}_{11/2}$	0.27	-35.06
	Band5	$\pi(dg)^7\otimes\nu(ds)^{-1}h^{-3}_{11/2}$	0.13	-10.584
	Band6	$\pi(dg)^6h^1_{11/2}\otimes\nu h^{-4}_{11/2}$	0.13	5,09
	Band7	$\pi(dg)^5h^2_{11/2}\otimes\nu(ds)^{-1}h^{-3}_{11/2}$	0.14	5,26
	Band9	$\pi(dg)^7\otimes\nu h^{-4}_{11/2}$	0.09	-14.55
	Band10	$\pi(dg)^6h^1_{11/2}\otimes\nu(ds)^{-1}h^{-3}_{11/2}$	0.12	-23.99
$^{135}_{58}Ce$	Band2	$\pi(dg)^7h^1_{11/2}\otimes\nu(ds)^{-2}h^{-3}_{11/2}$	0.16	26,7
	Band3	$\pi(dg)^6h^2_{11/2}\otimes\nu(ds)^{-2}h^{-3}_{11/2}$	0.18	26.56
	Band5	$\pi(dg)^6h^2_{11/2}\otimes\nu(ds)^{-2}h^{-3}_{11/2}$	0.18	26.75
	Band6	$\pi(dg)^8\otimes\nu(ds)^{-2}h^{-3}_{11/2}$	0.14	-39.48

3. Results and Discussion

Nuclei	*Bands*	*Configurations*	ε_2	$\gamma°$
$^{135}_{56}Ba$	Band2	$\pi(dg)^4h^2_{11/2}\otimes\nu(ds)^{-1}h^{-2}_{11/2}$	0.13	29,33
	Band4	$\pi(dg)^5h^1_{11/2}\otimes\nu(ds)^{-1}h^{-2}_{11/2}$	0.11	16,76
$^{135}_{57}La$	Band1	$\pi(dg)^7\otimes\nu(ds)^{-2}h^{-2}_{11/2}$	0.14	31,7
	Band2	$\pi(dg)^5h^2_{11/2}\otimes\nu(ds)^{-2}h^{-2}_{11/2}$	0.27	-35.06
	Band5	$\pi(dg)^7\otimes\nu(ds)^{-1}h^{-3}_{11/2}$	0.13	-10.584
	Band6	$\pi(dg)^6h^1_{11/2}\otimes\nu h^{-4}_{11/2}$	0.13	5,09
	Band7	$\pi(dg)^5h^2_{11/2}\otimes\nu(ds)^{-1}h^{-3}_{11/2}$	0.14	5,26
	Band9	$\pi(dg)^7\otimes\nu h^{-4}_{11/2}$	0.09	-14.55
	Band10	$\pi(dg)^6h^1_{11/2}\otimes\nu(ds)^{-1}h^{-3}_{11/2}$	0.12	-23.99
$^{135}_{58}Ce$	Band2	$\pi(dg)^7h^1_{11/2}\otimes\nu(ds)^{-2}h^{-3}_{11/2}$	0.16	26,7
	Band3	$\pi(dg)^6h^2_{11/2}\otimes\nu(ds)^{-2}h^{-3}_{11/2}$	0.18	26.56
	Band5	$\pi(dg)^6h^2_{11/2}\otimes\nu(ds)^{-2}h^{-3}_{11/2}$	0.18	26.75
	Band6	$\pi(dg)^8\otimes\nu(ds)^{-2}h^{-3}_{11/2}$	0.14	-39.48

3. Results and Discussion

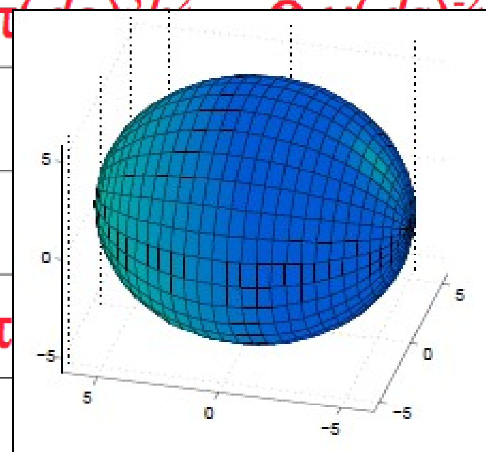
Nuclei	*Bands*	*Configurations*	ε_2	$\gamma°$
$^{135}_{56}$Ba	Band2	$\pi(dg)^4h^2_{11/2}\otimes\nu(ds)^{-1}h^{-2}_{11/2}$	0.13	29,33
	Band4	$\pi(dg)^5h^1_{11/2}\otimes\nu(ds)^{-1}h^{-2}_{11/2}$	0.11	16,76
$^{135}_{57}$La	Band1	$\pi(dg)^7\otimes\nu(ds)^{-2}h^{-2}_{11/2}$	0.14	31,7
	Band2	$\pi(dg)^5h^2_{11/2}\otimes\nu(ds)^{-2}h^{-2}_{11/2}$	0.27	-35.06
	Band5	$\pi(dg)^7\otimes\nu(ds)^{-1}h^{-3}_{11/2}$	0.13	-10.584
	Band6	$\pi(dg)^6h^1_{11/2}\otimes\nu h^{-4}_{11/2}$	0.13	5,09
	Band7	$\pi(dg)^5h^2_{11/2}\otimes\nu(ds)^{-1}h^{-3}_{11/2}$	0.14	5,26
	Band9	$\pi(dg)^7\otimes\nu h^{-4}_{11/2}$	0.09	-14.55
	Band10	$\pi(dg)^6h^1_{11/2}\otimes\nu(ds)^{-1}h^{-3}_{11/2}$	0.12	-23.99
$^{135}_{58}$Ce	Band2	$\pi(dg)^7h^1_{11/2}\otimes\nu(ds)^{-2}h^{-3}_{11/2}$	0.16	26,7
	Band3	$\pi(dg)^6h^2_{11/2}\otimes\nu(ds)^{-2}h^{-3}_{11/2}$	0.18	26.56
	Band5	$\pi(dg)^6h^2_{11/2}\otimes\nu(ds)^{-2}h^{-3}_{11/2}$	0.18	26.75
	Band6	$\pi(dg)^8\otimes\nu(ds)^{-2}h^{-3}_{11/2}$	0.14	-39.48

3. Results and Discussion

Nuclei	*Bands*	*Configurations*	ε_2	$\gamma°$
$^{135}_{56}Ba$	Band2	$\pi(dg)^4h^2_{11/2} \otimes \nu(ds)^{-1}h^{-2}_{11/2}$	0.13	29,33
	Band4	$\pi(dg)^5h^1_{11/2} \otimes \nu(ds)^{-1}h^{-2}_{11/2}$	0.11	16,76
$^{135}_{57}La$	Band1	$\pi(dg)^7 \otimes \nu(ds)^{-2}h^{-2}_{11/2}$	0.14	31,7
	Band2	$\pi(dg)^5h^2_{11/2} \otimes \nu(ds)^{-2}h^{-2}_{11/2}$	0.27	-35.06
	Band5	$\pi(dg)^7 \otimes \nu(ds)^{-1}h^{-3}_{11/2}$	0.13	-10.584
	Band6	$\pi(dg)^6 h^1_{11/2} \otimes \nu h^{-4}_{11/2}$	0.13	5,09
	Band7	$\pi(dg)^5 h^2_{11/2} \otimes \nu(ds)^{-1}h^{-3}_{11/2}$	0.14	5,26
	Band9	$\pi(dg)^7 \otimes \nu h^{-4}_{11/2}$	0.09	-14.55
	Band10	$\pi(dg)^6 h^1_{11/2} \otimes \nu(ds)^{-1}h^{-3}_{11/2}$	0.12	-23.99
$^{135}_{58}Ce$	Band2	$\pi(dg)^7h^1_{11/2} \otimes \nu(ds)^{-2}h^{-3}_{11/2}$	0.16	26,7
	Band3	$\pi(dg)^6h^2_{11/2} \otimes \nu(ds)^{-2}h^{-3}_{11/2}$	0.18	26.56
	Band5	$\pi(dg)^6h^2_{11/2} \otimes \nu(ds)^{-2}h^{-3}_{11/2}$	0.18	26.75
	Band6	$\pi(dg)^8 \otimes \nu(ds)^{-2}h^{-3}_{11/2}$	0.14	-39.48

3. Results and Discussion

Nuclei	*Bands*	*Configurations*	ε_2	$\gamma°$
$^{135}_{56}Ba$	Band2	$\pi(dg)^4h^2_{11/2} \otimes \nu(ds)^{-1}h^{-2}_{11/2}$	0.13	29,33
	Band4	$\pi(dg)^5h^1_{11/2} \otimes \nu(ds)^{-1}h^{-2}_{11/2}$	0.11	16,76
$^{135}_{57}La$	Band1	$\pi(dg)^7 \otimes \nu(ds)^{-2}h^{-2}_{11/2}$	0.14	31,7
	Band2	π … $h^{-2}_{11/2}$	0.27	-35.06
	Band5	… $_{11/2}$	0.13	-10.584
	Band6	… $_{1/2}$	0.13	5,09
	Band7	π … $h^{-3}_{11/2}$	0.14	5,26
	Band9	…	0.09	-14.55
	Band10	$\pi(dg)^6 h^1_{11/2} \otimes \nu(ds)^{-1}h^{-3}_{11/2}$	0.12	-23.99
$^{135}_{58}Ce$	Band2	$\pi(dg)^7h^1_{11/2} \otimes \nu(ds)^{-2}h^{-3}_{11/2}$	0.16	26,7
	Band3	$\pi(dg)^6h^2_{11/2} \otimes \nu(ds)^{-2}h^{-3}_{11/2}$	0.18	26.56
	Band5	$\pi(dg)^6h^2_{11/2} \otimes \nu(ds)^{-2}h^{-3}_{11/2}$	0.18	26.75
	Band6	$\pi(dg)^8 \otimes \nu(ds)^{-2}h^{-3}_{11/2}$	0.14	-39.48

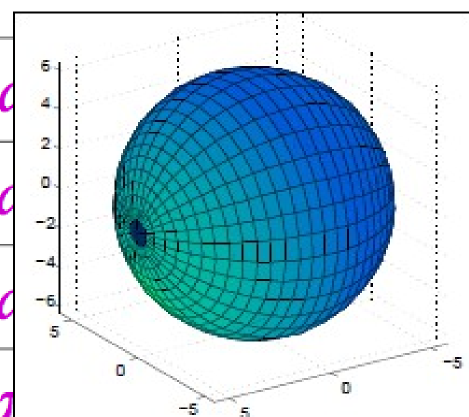


3. Results and Discussion

Nuclei	Bands	Configurations	ε_2	$\gamma°$
$^{135}_{56}Ba$	Band2	$\pi(dg)^4h^2_{11/2} \otimes \nu(ds)^{-1}h^{-2}_{11/2}$	0.13	29,33
	Band4	$\pi(dg)^5h^1_{11/2} \otimes \nu(ds)^{-1}h^{-2}_{11/2}$	0.11	16,76
$^{135}_{57}La$	Band1	$\pi(dg)^7 \otimes \nu(ds)^{-2}h^{-2}_{11/2}$	0.14	31,7
	Band2	$\pi(dg)^5h^2_{11/2} \otimes \nu(ds)^{-2}h^{-2}_{11/2}$	0.27	-35.06
	Band5	$\pi(dg)^7 \otimes \nu(ds)^{-1}h^{-3}_{11/2}$	0.13	-10.584
	Band6	$\pi(dg)^6 h^1_{11/2} \otimes \nu h^{-4}_{11/2}$	0.13	5,09
	Band7	$\pi(dg)^5 h^2_{11/2} \otimes \nu(ds)^{-1}h^{-3}_{11/2}$	0.14	5,26
	Band9	$\pi(dg)^7 \otimes \nu h^{-4}_{11/2}$	0.09	-14.55
	Band10	$\pi(dg)^6 h^1_{11/2} \otimes \nu(ds)^{-1}h^{-3}_{11/2}$	0.12	-23.99
$^{135}_{58}Ce$	Band2	$\pi(dg)^7h^1_{11/2} \otimes \nu(ds)^{-2}h^{-3}_{11/2}$	0.16	26,7
	Band3	$\pi(dg)^6h^2_{11/2} \otimes \nu(ds)^{-2}h^{-3}_{11/2}$	0.18	26.56
	Band5	$\pi(dg)^6h^2_{11/2} \otimes \nu(ds)^{-2}h^{-3}_{11/2}$	0.18	26.75
	Band6	$\pi(dg)^8 \otimes \nu(ds)^{-2}h^{-3}_{11/2}$	0.14	-39.48

3. Results and Discussion

Nuclei	Bands	Configurations	ε_2	$\gamma°$
$^{135}_{56}Ba$	Band2	$\pi(dg)^4h^2_{11/2} \otimes \nu(ds)^{-1}h^{-2}_{11/2}$	0.13	29,33
	Band4	$\pi(dg)^5h^1_{11/2} \otimes \nu(ds)^{-1}h^{-2}_{11/2}$	0.11	16,76
$^{135}_{57}La$	Band1	$\pi(dg)^7 \otimes \nu(ds)^{-2}h^{-2}_{11/2}$	0.14	31,7
	Band2	$\pi(dg)^5h^2_{11/2} \otimes \nu(ds)^{-2}h^{-2}_{11/2}$	0.27	-35.06
	Band5	$\pi(dg)^7 \otimes \nu(ds)^{-1}h^{-3}_{11/2}$	0.13	-10.584
	Band6	$\pi(dg)^6 h^1_{11/2} \otimes \nu h^{-4}_{11/2}$	0.13	5,09
	Band7	$\pi(dg)^5 h^2_{11/2} \otimes \nu(ds)^{-1}h^{-3}_{11/2}$	0.14	5,26
	Band9	$\pi(dg)^7 \otimes \nu h^{-4}_{11/2}$	0.09	-14.55
	Band10	$\pi(dg)^6 h^1_{11/2} \otimes \nu(ds)^{-1}h^{-3}_{11/2}$	0.12	-23.99
$^{135}_{58}Ce$	Band2	π(d … ${}^{-3}_{11/2}$	0.16	26,7
	Band3	π(d … ${}^{-3}_{11/2}$	0.18	26.56
	Band5	π(d … ${}^{-3}_{11/2}$	0.18	26.75
	Band6	… /2	0.14	-39.48



4. SUMMARY

- High spin states of ^{135}Ba, ^{135}La and ^{135}Ce isobars are interpreted by CNS code. Calculation Results are represented by plots and curves : $E - E_{RLD}(I)$, *PES*, $J^{(1)}(\omega)$, ...

4. **SUMMARY**

- High spin states of ^{135}Ba, ^{135}La and ^{135}Ce isobars are interpreted by CNS code. Calculation Results are represented by plots and curves : $E - E_{RLD}(I)$, *PES*, $J^{(1)}(\omega)$, ...

- In general these isobars shows a pronounced triaxiality **but** also axial symetric shapes: prolate in bands 6 and 7 of ^{135}La, oblate in band 6 of ^{135}Ce.
  → These nuclei shows shape co-existence phenomenon.

4. SUMMARY

- High spin states of ^{135}Ba, ^{135}La and ^{135}Ce isobars are interpreted by CNS code. Calculation Results are represented by plots and curves : $E - E_{RLD}(I)$, PES, $J^{(1)}(\omega)$, ...

- In general these isobars shows a pronounced triaxiality **but** also axial symetric shapes: prolate in bands 6 and 7 of ^{135}La, oblate in band 6 of ^{135}Ce.
  → These nuclei shows shape co-existence phenomenon.

- The quadrupole deformation in not very important for baryum and lanthane nuclei $\varepsilon_2 \sim 0.1 - 0.14$, except band2 of ^{135}La where $\varepsilon_2 \sim 0.27$. the 135Ce seems to be more deformed $\varepsilon_2 \sim 0.17$.

4. SUMMARY

- High spin states of ^{135}Ba, ^{135}La and ^{135}Ce isobars are interpreted by CNS code. Calculation Results are represented by plots and curves : $E - E_{RLD}(I)$, *PES*, $J^{(1)}(\omega)$, ...

- In general these isobars shows a pronounced triaxiality **but** also axial symetric shapes: prolate in bands 6 and 7 of ^{135}La, oblate in band 6 of ^{135}Ce.
  → These nuclei shows shape co-existence phenomenon.

- The quadrupole deformation in not very important for baryum and lanthane nuclei $\varepsilon_2 \sim 0.1 - 0.14$, except band2 of ^{135}La where $\varepsilon_2 \sim 0.27$. the 135Ce seems to be more deformed $\varepsilon_2 \sim 0.17$.

- High-spin states are explained basing on simple configurations formed by a combined contribution on 3- 5 neutron holes in $h_{11/2}$ orbitals and *(ds)* sub-shells and by 1- 2 protons excitations to the $h_{11/2}$ orbitals.

4. SUMMARY

- High spin states of ^{135}Ba, ^{135}La and ^{135}Ce isobars are interpreted by CNS code. Calculation Results are represented by plots and curves : $E - E_{RLD}(I)$, *PES*, $J^{(1)}(\omega)$, ...

- In general these isobars shows a pronounced triaxiality **but** also axial symetric shapes: prolate in bands 6 and 7 of ^{135}La, oblate in band 6 of ^{135}Ce.
  → These nuclei shows shape co-existence phenomenon.

- The quadrupole deformation in not very important for baryum and lanthane nuclei $\varepsilon_2 \sim 0.1 - 0.14$, except band2 of ^{135}La where $\varepsilon_2 \sim 0.27$. the 135Ce seems to be more deformed $\varepsilon_2 \sim 0.17$.

- High-spin states are explained basing on simple configurations formed by a combined contribution on 3- 5 neutron holes in $h_{11/2}$ orbitals and *(ds)* sub-shells and by 1- 2 protons excitations to the $h_{11/2}$ orbitals.

4. SUMMARY

- High spin states of ^{135}Ba, ^{135}La and ^{135}Ce isobars are interpreted by CNS code. Calculation Results are represented by plots and curves : $E - E_{RLD}(I)$, PES, $J^{(1)}(\omega)$, ...

- In general these isobars shows a pronounced triaxiality **but** also axial symetric shapes: prolate in bands 6 and 7 of ^{135}La, oblate in band 6 of ^{135}Ce.
  → These nuclei shows shape co-existence phenomenon.

- The quadrupole deformation in not very important for baryum and lanthane nuclei $\varepsilon_2 \sim 0.1 - 0.14$, except band2 of ^{135}La where $\varepsilon_2 \sim 0.27$. the 135Ce seems to be more deformed $\varepsilon_2 \sim 0.17$.

- High-spin states are explained basing on simple configurations formed by a combined contribution on 3- 5 neutron holes in $h_{11/2}$ orbitals and *(ds)* sub-shells and by 1- 2 protons excitations to the $h_{11/2}$ orbitals.

- The proposed structures are generally in a good agreement with the observed results for these nuclei.

Thank you for your Attention :)!