^{135}Pr - two-phonon band included

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1 Rezultate

1.1 Notatii

Am folosit aceleasi nume pentru benzi precum Sensharma in articolul lui.

- Yr $\rightarrow$ banda yrast
- $TW1$ $\rightarrow$ prima banda de wobbling - *one-phonon wobbling band*
- $TW2$ $\rightarrow$ a doua banda de wobbling - *two-phonon wobbling band*

1.2 Rezultate fara fit

Am incercat sa adun cantitatea $\omega(I-1)$ pentru fiecare stare $E_{\text{TW2;exc}}(I)$ din TW2 peste starile $E_{\text{TW1;exc}}(I-1)$. RMS-ul obtinul este destul de mare: $E_{\text{RMS}} \approx 350$ keV.

Deci am reluat algoritmul de fit de la zero, in care am introdus si a doua banda fononica in calcule (in total trei benzi).

1.3 Rezultate dupa fit

Pentru energii am folosit formula (4.3) din draft impreuna cu (4.4) pentru frecventa de wobbling. Evident am pastrat calculele cu energia de *excitatie*, adica toate starile sunt normate la prima stare din band Yr $E_{\text{Yr}}^{11/2} \equiv E_{\text{gs}}$. Energiile sunt astfel:

1.3.1 Banda yrast - Yr

$$E^I_{\text{Yr;exc}} = H^I_{\text{min}} + \frac{\omega^I}{2} - E_{\text{gs}} \tag{1}$$

cu secventa de spini:

$$I_{\text{Yr;exc}} = \{15/2, 19/1, 23/2, \ldots, 55/2\}\,, \text{ Nr. de stari } n_{\text{Yr}} = 11 \tag{2}$$

1.3.2 Banda 1-fononica - TW1

$$E^I_{\text{TW1;exc}} = H^I_{\text{min}} + \frac{\omega^I}{2} - E_{\text{gs}} \tag{3}$$

cu secventa de spini:

$$I_{\text{TW1}} = \{17/2, 21/1, 23/2, \ldots, 33/2\}\,, \text{ Nr. de stari } n_{\text{TW1}} = 5 \tag{4}$$

1.3.3 Banda 2-fononica - TW2

$$E^{I}_{\text{TW2;exc}} = E^{I-1}_{\text{TW1;exc}} + \omega^{I-1} \tag{5}$$

cu secventa de spini:

$$I_{\text{TW2}} = \{19/2, \ldots, 31/2\}\,, \text{ Nr. de stari } n_{\text{TW2}} = 4 \tag{6}$$

Numarul total de stari este $N = 20$.

1.3.4 Fit

Am cautat setul de parametrii $\mathbf{X} = \{\theta, \mathcal{I}_1, \mathcal{I}_2, \mathcal{I}_3\}$ care imi produce cel mai mic RMS; si anume am calculat minimul functiei

$$f(\mathbf{X}) = \sqrt{\frac{\sum_i^N \left[E_{\text{exp;exc}} - E_{\text{th;exc}}\right]^2}{N+1}} \tag{7}$$

2 Reprezentare schematica pentru metoda de generare a excitatiilor de wobbling in ^{135}Pr.

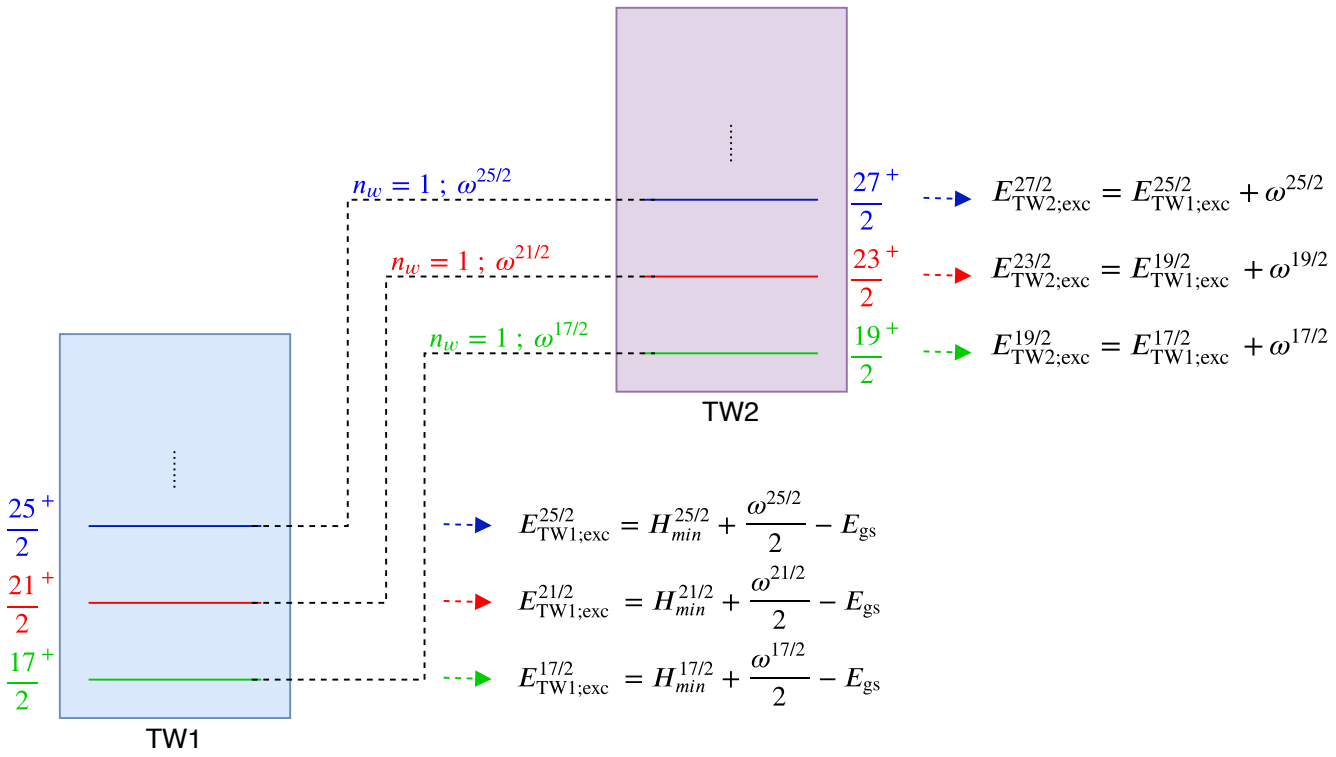

Figure 1: TW1,TW2

3 Rezultate numerice

Cu acest program am obtinut:

- $\theta = -71^o$
- MOIs: $\mathcal{I}_1 = 89, \mathcal{I}_2 = 12, \mathcal{I}_3 = 48$
- $E_{\text{RMS}} = 0.174452$

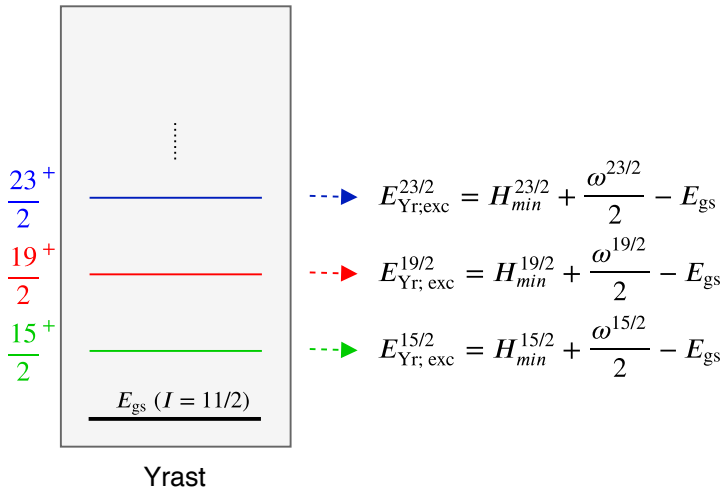

Figure 2: YRAST

4 Reprezentari grafice

4.1 Energii

Energiile de excitatie in functie de parametrii de fit.

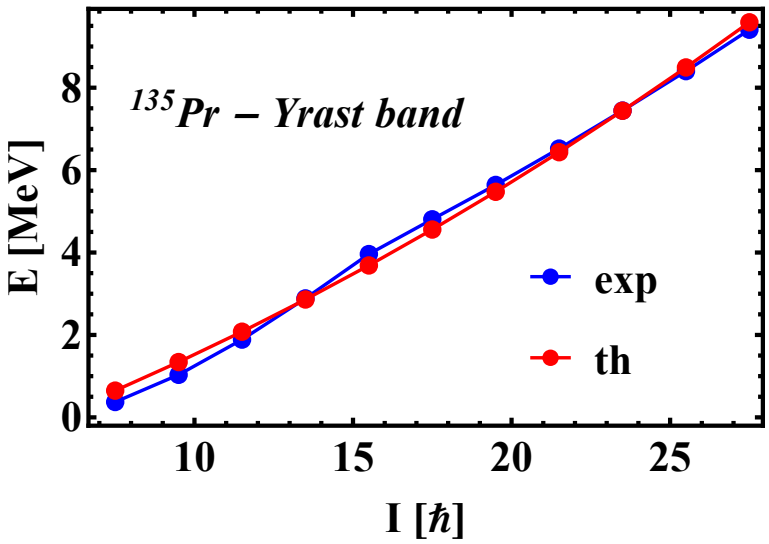

Figure 3: Banda yrast

I	ω^I
7.5	0.239624
9.5	0.295775
11.5	0.35077
13.5	0.405102
15.5	0.459018
17.5	0.512653
19.5	0.566089
21.5	0.619381
23.5	0.672562
25.5	0.725658
27.5	0.778687
8.5	0.267893
10.5	0.323378
12.5	0.378
14.5	0.432102
16.5	0.485864
9.5	0.295775
11.5	0.35077
13.5	0.405102
15.5	0.459018

Table 1: Frecventele de wobbling pentru parametrii obtinuti, pentru toti spinii.

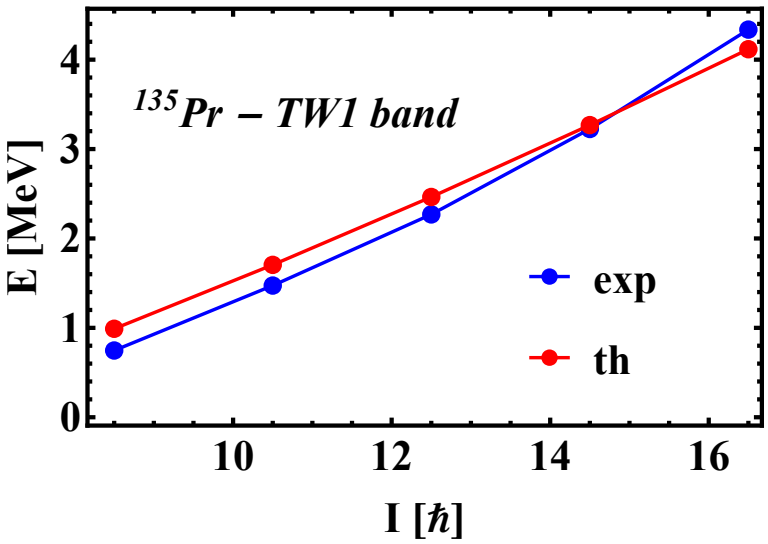

Figure 4: Banda TW1

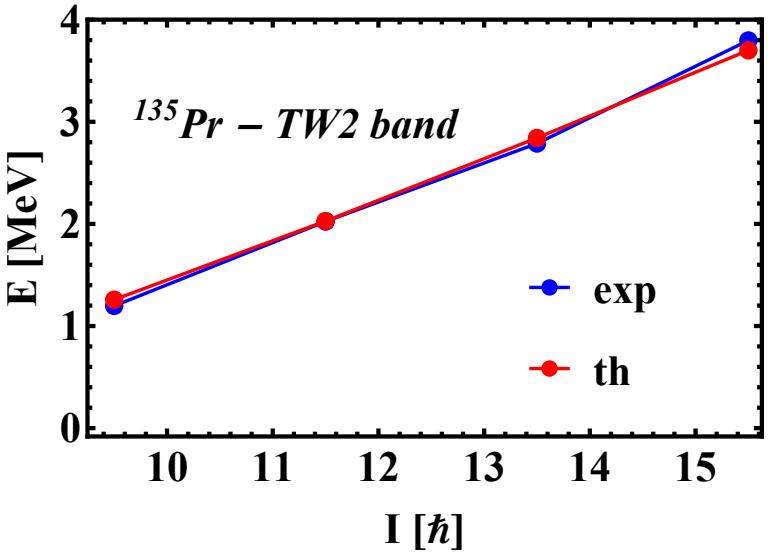

Figure 5: Banda TW2

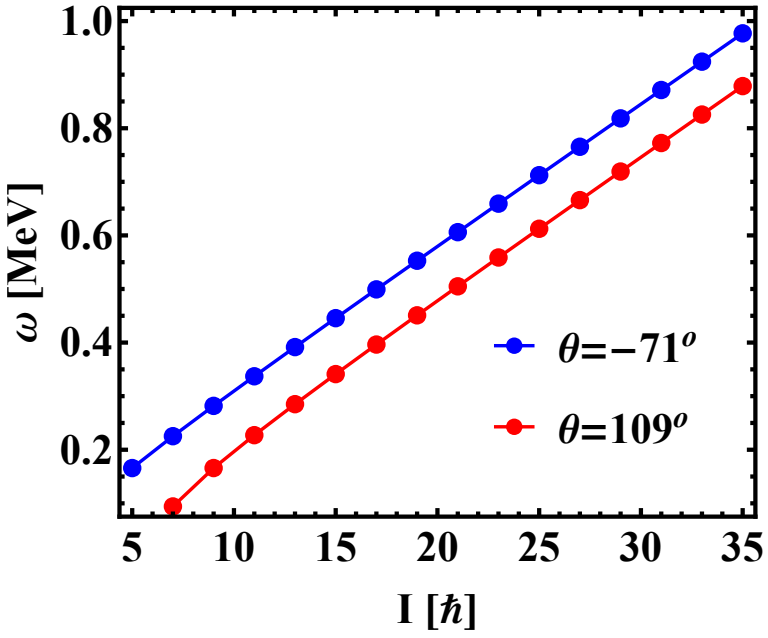

Figure 6: Frecventele de wobbling pentru θ si $\theta + \pi$.