



Contribution ID: 98

Type: Invited Oral

Absolute electromagnetic transition rates in semi-magic $N = 50$ and 126 isotones as a test for $(\pi_{9/2})^n$ single particle calculations.

Tuesday, July 18, 2023 9:45 AM (25 minutes)

Assuming the presence of one- and two-body interactions, single- j calculations for $(j)^n$ configurations with $n = 1, \dots, 2j+1$ can be performed using a semi-empirical approach, provided that the energies and absolute electromagnetic transition rates are known for the two-particle (hole) nucleus. Using those and the coefficients of fractional parentage, all needed matrix elements for the $(j)^n$ configurations can be predicted.

At the Cologne Tandem Accelerator of the Institute for Nuclear Physics we have tested these relations by measuring lifetimes of excited states in the $(\pi_{9/2})^n$ isotones with $N = 50$ and $N = 126$ over the last years. We started the studies in the two-proton nucleus ^{210}Po where the abnormal $B(E2:2_1^+ \rightarrow 0_1^+)$ value was remeasured, providing important input for the other configurations [1]. Then lifetimes of excited states in ^{211}At were measured using the electronic γ - γ fast timing technique, the Recoil Distance Doppler Shift (RDDS) method, and the Doppler Shift Attenuation (DSA) method-[2,3]. Very good agreement with the analytical single- j calculation is obtained. We will also shortly report on our study of ^{213}Fr .

For $N=50$ isotones, we recently started by remeasuring the previously unknown $B(E2:4_1^+ \rightarrow 2_1^+)$ value needed for the prediction of other $N=50$ isotones with $Z = 41-50$ [4]. We will also report on experiments on ^{93}Tc , ^{94}Ru and ^{96}Pd , as well on ^{94}Ru and ^{95}Rh at FAIR Phase-0 [5].

- [1] D. Kocheva, G. Rainovski, J. Jolie, N. Pietralla, A. Blazhev, *et al.* Eur. Phys. J. A 53 (2017) 175
- [2] V. Karayonchev, A. Blazhev, A. Esmaylzadeh, J. Jolie, M. Dannhoff, F. Diel, F. Dunkel, C. Fransen, L. M. Gerhard, R.-B. Gerst, L. Knafla, L. Kornwebel, C. Müller-Gatermann, J.-M. Régis, N. Warr, K. O. Zell, M. Stoyanova, and P. Van Isacker, Phys. Rev. C 99 (2019) 024326
- [3] V. Karayonchev, A. Blazhev, J. Jolie, A. Dewald, A. Esmaylzadeh, C. Fransen, G. Häfner, L. Knafla, C. Müller-Gatermann, G. Rainovski, J. -M. Régis, K. Schomacker, and P. Van Isacker, Phys. Rev. C 106, (2022) 044321.
- [4] M. Ley *et al.* in preparation.
- [5] B. Das *et al.*, Phys. Rev. C 105 (2022) L031304 and submitted.

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Session Classification: Session 4

Track Classification: Experimental Nuclear Structure