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

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Assuming the presence of one- and two-body interactions, single-j calculations for $(j)^n$ configurations with n = 1,..,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].\\

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