

## High-spin spectroscopy of $\pi$ - $\nu^{-1}$ couplings in $N < 126$ radium isotopes

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The region of nuclei around doubly magic  $^{208}\text{Pb}$  is well known as a testing ground for the nuclear shell model. The presence of long-lived isomers is often associated with states where simple particle configurations have their component nucleon angular momenta aligned to the maximum possible value. While many nuclei are well-studied, there are a number of neutron-deficient cases where fission competition becomes a major limitation, or where a very long-lived isomer has precluded simple correlations of the high-spin level scheme with the known low-lying structure.

High-spin excited states in  $^{212,213}\text{Ra}$  were populated with pulsed beams from the ANU 14UD accelerator via the  $^{204}\text{Pb}(^{12}\text{C},4n)$  and  $^{204}\text{Pb}(^{13}\text{C},4n)$  reactions at 81 and 80 MeV, respectively. Coincidence spectroscopy performed with the CAESAR HPGe detector array has revealed two new isomers above the previously known  $J^\pi = 17/2^-$ ,  $t_{1/2} = 2.15$ -ms isomer in  $^{213}\text{Ra}$ . The new isomers have with  $J^\pi = 23/2^+$ ,  $t_{1/2} = 17.1(4)$  ns and  $J^\pi = 33/2^+$ ,  $t_{1/2} = 37(1)$  ns. Transition multipolarities have been established throughout the extended level schemes of  $^{212,213}\text{Ra}$  using angular distributions and inference of internal conversion coefficients from intensity balances. Through comparison with semi-empirical shell model calculations, the particle configurations of both isomers were found to involve excitation of a proton from the  $h_{9/2}$  orbital into the  $i_{13/2}$  orbital. This presentation will focus on the properties of these isomers and their relevance to nuclear structure around the  $N = 126$  shell closure. An extension of the  $^{212}\text{Ra}$  level scheme to higher spin will also be discussed.