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

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The region of nuclei around doubly magic $^{208}$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 $^{212,213}$Ra were populated via the $^{204}$Pb($^{12}$C,4n) and $^{204}$Pb($^{13}$C,4n) reactions, using pulsed beams from the ANU 14UD accelerator 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 = 17/2$^-$, $t_{1/2}$ = 2.15-ms isomer [1] in $^{213}$Ra. Several new isomers above the J = 11$^-$, $t_{1/2}$ = 590-ns isomer [2] in $^{212}$Ra have also been observed. Transition multipolarities have been established throughout the extended level schemes of $^{212,213}$Ra using angular distributions and inference of internal conversion coefficients from intensity balances. Particle configurations have been assigned to many states in each level scheme through comparison to semi-empirical shell model calculations. Extension of the $^{212,213}$Ra level schemes will be discussed emphasising the properties of the new isomers and their relevance to nuclear structure around the $N$ = 126 shell closure.

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[1] G. Neyens et al., Phys. Rev. C 49, 645 (1994).
[2] T.Kohno et al., Phys.Rev. C33, 392 (1986)