Alpha - gamma decay study of $^{261}\text{Sg}$ and $^{257}\text{Rf}$

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The research of low lying single-particle orbitals in odd mass heavy nuclei provides unique probe to nuclear structure and is a valuable source of information needed for testing reliability and predicting power of theoretical models based on macroscopic-microscopic approach. These so-called Nilsson levels are essentially determined by the unpaired nucleon up to excitation energies of several hundred keV. It was found experimentally that in this region single-particle levels follow systematic behavior along the isotonic chains in case of odd-A, even-Z nuclei. The systematic research of the isotones with N = 147, 149, 151 and 153 is a part of a long time project of nuclear spectroscopy studies carried out at velocity filter SHIP in GSI Darmstadt. Higher beam intensities and improvements in experimental techniques as well as analytical methods in recent years allowed to extend these investigations to even heavier members of mentioned odd-N isotonic chains.

Recent experimental runs performed at SHIP aimed at study of odd-A, even-Z transmermium isotopes will be reviewed in detail, giving the spectroscopic information acquired for $^{261}\text{Sg}$ and its decay products synthesized in the reaction $^{208}\text{Pb}^{(54}\text{Cr,}\alpha)^{261}\text{Sg}$. New data derived by means of recoil-$\alpha-\alpha$ and/or $\alpha-\gamma$ analysis concerning the low lying single-neutron orbitals in daughter products $^{257}\text{Rf}$ and $^{253}\text{No}$ will be discussed in respect to other recent experimental works performed at SHIP and other laboratories. An overview on new $\alpha$-decay and $\gamma$-decay data and improved data on the level structure and its comparison against theoretical calculations will be provided.