Search for one- and two-phonon octupole vibrational states in the spherical nuclei near $^{132}$Sn J.K. HWANG, J.H. HAMILTON, A.V. RAMAYYA, Vanderbilt University, Y.X. LUO, Vanderbilt University/LBNL — Excited high spin states in $^{135}$I, $^{136}$Xe, $^{137}$Cs, $^{138}$Ba, $^{139}$La, $^{140}$Ce and $^{142}$Nd with N=82 are reorganized and interpreted in a different way to find one-phonon octupole vibrational (POV) bands. Two nearly identical (similar) bands with $\Delta I=3$ are found in these nuclei. From the presence of two nearly identical excited bands with $\Delta I=3$ in these nuclei, one-POV bands are proposed. Also, high spin states of $^{134}$Sb, $^{134,135}$Te, $^{135,136}$I, $^{137}$Xe and $^{139}$Ba near $^{132}$Sn are reanalyzed in order to search for one- and two-POV states. New spins and parities are tentatively assigned to the 2203.9 keV state in $^{137}$Xe and the 1976.6 and 2091.7 keV states in $^{139}$Ba from the state energy plots of the $N=82$ and 83 nuclei. High spin states of $^{134}$Sb, $^{134,135}$Te, $^{135,136}$I, $^{137}$Xe and $^{139}$Ba connected by E1, E3/M2 and E3 transitions are proposed, for the first time, as zero-, one- and two-POV states. One- and two-POV states in $^{134}$Sb and $^{135}$Te are built on a $7^- (\pi g_{7/2}^{\nu}f_{7/2}^{\nu})$ state and a $19/2^- (\nu f_{7/2}^{\nu} \otimes 6_1^+)$ state, respectively. One-POV states built on the $19/2^- (\nu f_{7/2} \otimes 6_1^+)$ and the $21/2^- (\nu h_{9/2} \otimes 6_2^+)$ states coexist in $^{137}$Xe. Then, one- and two-POV states in $^{139}$Ba are built only on the $21/2^- (\nu h_{9/2} \otimes 6_2^+)$ state. One- and two-POV states in $^{134}$Te are built on the $6_2^+$ state with some mixing with the $6_1^+$ state.

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