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Identification of high spin states in $^{137,138}$Cs nuclei

K. LI, Y.X. LUO, J.K. HWANG, A.V. RAMAYYA, J.H. HAMILTON, H.L. CROWELL, C. GOODIN, Vanderbilt Univ., J.O. RASMUSSEN, I.Y. LEE, S.C. WU, LBNL, G.M. TER-AKOPIAN, A.V. DANIEL, JINR(Dubna), J.D. COLE, INL, A. COVELLO, A. GARGANO, Univ. di Napoli Fed. II, R. DONANGELO, Univ. Fed. do Rio de Janeiro, W.C. MA, Mississippi State Univ., M.A. STOYER, LLNL, S.J. ZHU, Tsinghua Univ. — High spin states of $^{137,138}$Cs have been studied by measuring the $\gamma - \gamma - \gamma$ coincidences from the spontaneous fission of $^{252}$Cf with the Gammasphere detector array. The level scheme of the N=83 neutron-rich Cs (Z=55) isotope, $^{138}$Cs, has been established for the first time up to a 4626keV level assigned $(16^+)$ and that of $^{137}$Cs has been expanded up to a 5495keV level assigned $(31/2^-)$. Spins, parities and configurations are assigned based on shell model calculations and level systematics. Pronounced differences in low-lying yrast cascade patterns are seen between N=83 isotones $^{138}$Cs (Z=55), $^{134}$Sb (Z=51) and $^{136}$I (Z=53), and between Cs isotopes $^{138}$Cs and $^{137}$Cs. Significant similarity is observed in the N=82 isotones $^{137}$Cs and $^{135}$I up to $17/2^+$ but not above the spin nor with $^{133}$Sb, which indicates the important role played by interactions between the excitation of the $g_{7/2}$ valence protons outside the Z=50 major shell, and the $f_{7/2}$ valence neutron outside the N=82 major shell.

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