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Two-quasiparticle states in ^{252,254}No and the stability of superheavy nuclei[1] T.L. KHOO, Argonne National Laboratory, S.K. TANDEL, Univ. Massachusetts Lowell, A. ROBINSON, D. SEWERYNIAK, F.G. KONDEV, Argonne National Laboratory — Two-quasiparticle (qp) states in shell-stabilized nuclei probe the levels that govern the stability of superheavy nuclei, test 2-qp energies from theory and, thereby, check their predictions of magic gaps. We have identified in ^{254}No 2- and 4-qp isomers, with quantum numbers $K^{\pi} = 8^{-}$ and (14^{+}), and a low-energy 2-qp $K^{\pi}= 3^{+}$ state, as well as a $K^{\pi} = 8^{-}$isomer in^{252}No. The use of Woods-Saxon single-particle energies reproduces the experimental proton 2-qp energies in ^{254}No. Some shortcomings in the 2-qp energies from self-consistent mean-field theories suggest that their predictions of magic gaps at Z=120 and 126 should be viewed with reservations. The resilient survival of superheavy nuclei with high Z, up to 118, well past the onset of spontaneous fission at Z=92, is an interesting phenomenon in nuclear and mesoscopic physics. This research was conducted by a collaboration from Argonne National Laboratory and the Universities of Massachusetts Lowell, Jyväskylä, Köln, Liverpool, Maryland, Notre Dame and Yale.

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