The effect of the tensor force on the predicted shell closures in superheavy nuclei

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The effect of the tensor component of the effective nucleon-nucleon interaction on the single-particle structure in the superheavy element regime is studied within the framework of the spherical Skyrme Hartree-Fock + BCS model. A selection of the available Skyrme parameter sets have been chosen and their predictions for the proton and neutron shell closures investigated.

The inclusion of the tensor term with realistic coupling strength parameters consistently leads to an increased spin-orbit splitting between the $1i_{13/2}$ and $2f_{7/2}$ proton levels, opening the Z=114 shell gap. The Z=126 gap, predicted by these models in the absence of the tensor term, is found to be unchanged in some cases but closed in others. The traditional prediction of an N=184 shell closure remains robust across all Skyrme parameter sets.