

## One quasi-particle states with low angular momentum in neutron-rich nuclei

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We have added a weakly repulsive external potential to the self-consistent mean field in Hartree-Fock-bogoliubov calculations in order to see the responses of the low angular momentum orbitals to a shallowing potential. It is seen that the bound state nature of the  $d_{5/2}$  and  $s_{1/2}$  quasi-particle states in neutron-rich Ni isotopes are very sensitive to the form of the pairing interaction employed and to the depth of the mean field. When the system gets less bound, the odd-even staggering in the charge radii as well as the effect of the tensor force on the shell gap are expected to be reduced.

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