

## Neutron-proton Pairing Correlations and Deformation for $N = Z$ Nuclei in $sd, pf, gd$ -shell by the deformed BCS and HFB approach

We investigated neutron-proton pairing correlations effects on the shell evolution of ground state energies by the deformation for  $N = Z$  nuclei in  $sd, pf, dg$ -shell. We started from a simple shell-filling model constructed by a deformed Woods-Saxon potential with  $\beta_2$  deformation, and included pairing correlations in the residual interaction, which give rise to smearing of the Fermi surface revealing interesting evolution of the Fermi energy along the shell evolution. In this work, like-pairing and unlike-pairing correlations decomposed as isoscalar  $T = 1$  and isovector  $T = 0$  components are explicitly taken into account. Finally, we estimate ground state energies comprising the mean field energy, the pairing energy and the self-energy due to the pairing correlations, in terms of the deformation.

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