

Answer on Question #53913, Physics Nuclear Physics

Briefly explain properties of nuclear forces. Prove that they are charge independent and spin dependent.

Answer:

The strong forces of attraction which firmly hold the nucleons in the nucleus are known as nuclear forces. The forces holding the nucleus together must be extremely strong. This is clear from the fact that the positively charged protons remain confined to the small volume of the nucleus. If the nuclear forces are weak, the electrostatic repulsion of the positively charged protons would tend to break the nucleus apart or at the very least, the nucleus would occupy a much larger volume. Much is not known about the nuclear forces. However it is undoubtedly established that these forces exist between the nucleons i.e. between a neutron and a proton, between two protons and between two neutrons. The stability of the nucleus is accounted for due to the presence of these forces.

They are charge independent : They are the same between p and n or between p and p or between n and n. These forces do not depend upon the charge on the nucleons.

The nuclear forces are dependent on the spin of the nuclei. Nuclear forces are non-central forces : The force between two nucleons does not act along the line joining their centers. This shows that nucleons in the nucleus is not spherically symmetric.