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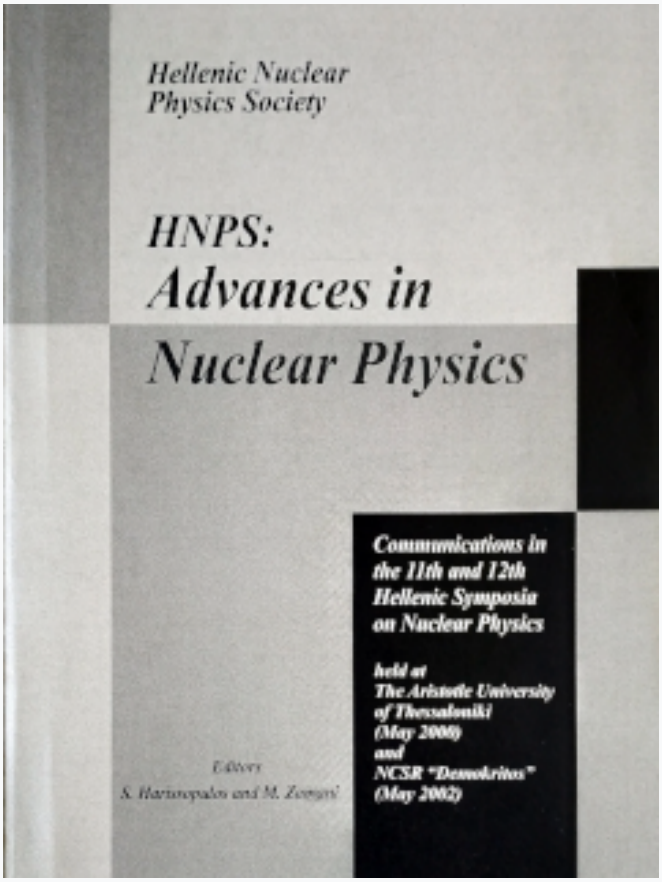

Nuclear structure is governed by the fundamental laws of electromagnetism

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Nuclear structure is governed by the fundamental laws of electromagnetism

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Abstract

Contradicting interpretations of the nuclear force as given by two contrasted approaches like the meson theory and the quantum chromodynamics, are overcome here by reviving the basic electromagnetic laws which are applicable on the existing charged subconstituents in nucleons. On this basis, considerable charge distributions in nucleons are determined after a careful analysis of the magnetic moments and the results of the deep inelastic scattering. Basic equations derived from the distributed charges of oriented spins of nucleons give strong and short ranged forces leading exactly to the binding energies of the deuteron and other nuclei. According to these interactions, p-p and n-n systems repel and only the p-n bonds form rectangles and closely packed parallelepipeds. Such contrary forces create structures of saturation and of finite number of nucleons. They also invalidate the charge independence hypothesis and differ fundamentally from the central potential and the effects of the Pauli principle of the electronic configurations responsible for the development of the models of the Fermi gas and nuclear shell. There are two kinds of p-n bonds, which imply anisotropy, leading often to elongated shapes of vibrational and rotational modes of excitation, while the surface tension contributes to the creation of non elongated shapes of stable arrangements. Finally, for A>40 a type of shell structure provides new rules for understanding the structure of magic nuclei for N>Z and the increasing ratio N/Z with A.