New Model for the Structure of the Atomic Nucleus: 10 Supporting Arguments for its Evaluation

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The structure of the atomic nucleus is among the most fundamental subjects in physics. A precise understanding of how its constituents are arranged and interact plays a significant role in explaining stability, isotopes, nuclear decay, and other properties of matter. Conventional physics describes nuclear behaviour primarily through a set of fundamental forces, including the strong interaction, the weak interaction, and the electromagnetic force.

Saleh Theory proposes a different structure for the proton and the neutron, and a different arrangement of these particles within the nucleus, in an attempt to explain certain nuclear properties from a new angle. Central to this model is the internal structure of the neutron and the positioning of protons and neutrons relative to one another, with particular emphasis on the role of Coulomb interaction in shaping this arrangement.
Ten testable arguments and consequences follow, offered as a basis for evaluating the model's capacity to explain the properties of atomic nuclei.

1. Describing Nuclear Structure through Coulomb Force

The Coulomb force is among the best-known forces acting between charged particles, directly observable and measurable outside the nucleus, with well-established properties and magnitude.
Based on the model proposed by the Saleh Research Group examines nuclear structure on the basis of this same well-known force and the laws governing it. Many properties of nuclei and elements, on this account, arise from the arrangement of charged particles and the interactions between them, without requiring a new structure or force to be introduced for each phenomenon.

2. Order and Structure across Different Levels of Existence

The universe at every scale displays motion and arrangement governed by definite order and pattern, observable from the solar system and galaxies down to molecules, atoms, and the bonds between them.
The constituents of the atomic nucleus might therefore be expected to possess a comparable arrangement and structure of their own. Differences in the properties of various nuclei, under this view, relate to the type of arrangement and positioning of subatomic particles within the nucleus.

3. Explaining the Weak Nuclear Force through the Proposed Structure and Coulomb Force

The Saleh Research Group's paper "Structure of Neutron" presents the neutron as composed of a small, dense, heavy proton at its centre, surrounded by an electron of larger radius.

This internal structure, and the neutron's position alongside the proton within the nucleus, together offer an explanation for neutron behaviour in the nuclear environment. When the neutron occupies a suitable position relative to the proton, Coulomb interactions between their charged constituents create conditions under which the neutron remains stable and does not spontaneously convert into a proton and an electron.
The phenomenon conventional physics associates with the weak nuclear force and beta decay can, from this standpoint, be examined within the framework of the proposed neutron structure and Coulomb interaction.

4. Explaining the Strong Nuclear Force through the Proposed Structure and Coulomb Force

Several protons occupying the exceedingly small space of the nucleus necessitates a definite arrangement of protons and neutrons in the proposed model. Because protons carry positive charge, placing them directly adjacent to one another produces electrical repulsion.
Neutrons, in this structure, occupy positions between protons; owing to their positive central region and negative outer shell, they influence the interaction between neighbouring protons. Part of the repulsion between protons is thereby moderated by electrical effects arising from neutron structure, providing the conditions necessary for a stable nuclear arrangement.
What conventional physics terms the strong nuclear force can accordingly be examined not through an independent force but through Coulomb's law and the specific arrangement of protons and neutrons within the nucleus.

5. The Origin of Nuclear Instability and Radioactivity

Radioactivity and the conversion of certain atomic nuclei into others are well-known phenomena in nuclear physics. Within the proposed model, this instability originates in the arrangement of particles within the nucleus.
A nuclear structure becomes prone to change whenever its internal arrangement fails to provide the conditions necessary for stability. Radioactivity, on this account, follows from the condition, arrangement, and internal balance of the nucleus's constituents.

6. Isotopes and Differences in Their Stability

A given element may possess several isotopes, share the same number of protons while differ in their number of neutrons — a well-known property of elements.
This difference in neutron number alters the nucleus's internal structure and may affect its stability. Differences in the number and arrangement of neutrons, within Saleh Theory, offer a basis for explaining both the existence of various isotopes and the differences between stable and unstable ones.

7. The Role of Neutrons in Nuclear Stability

Why the presence of neutrons contributes to nuclear stability is an important question in this field.
The proposed structure gives the neutron a positive charge at its centre, arising from the proton, and a negative charge at its outer region, arising from the electron, such that its net charge is neutral.

Overall neutrality, however, does not mean the electrical effects of the neutron's internal constituents are uniform at every distance. Once positioned between protons, the neutron's negative outer region sits adjacent to the surrounding positive protons.
The neutron can then act as an intermediary: preventing the direct proximity of protons while simultaneously influencing their interaction through its negative outer region. This intermediary role may be one of the factors responsible for establishing and maintaining nuclear stability.

8. Differences in Nuclear Binding Energy and Internal Arrangement

Nuclear binding energy varies between nuclei according to the number of protons, the number of neutrons, and their arrangement.
Protons and neutrons, in the Saleh model, are not merely a collection of particles without definite arrangement but possess definite structure and spatial relationships within the nucleus. Changes in the number and position of neutrons therefore alter how the nucleus's constituents interact, with consequences for binding energy.
Differences in binding energy across nuclei may accordingly be counted among the testable consequences of the proposed nuclear structure.

9. Changes in Nuclear Stability with Proton and Neutron Number

Electrical repulsion between positive charges increases as the number of protons increases, making the number and positioning of neutrons increasingly important for maintaining a stable arrangement. Neutrons, owing to their internal structure, may regulate the interaction between protons in the Saleh model, such that a specific ratio of protons to neutrons becomes necessary for a stable arrangement to be achieved.
A change in this ratio may displace the nucleus from equilibrium and increase the likelihood of instability and decay. The relationship between proton-to-neutron ratio and nuclear stability thus stands as a further subject for evaluating the model.

10. Nuclear Size and Spatial Structure through Particle Arrangement

Atomic nuclei change in size as the number of protons and neutrons increases, though size depends not on particle number alone but also on how particles are positioned within the exceedingly small nuclear space.
Protons and neutrons possess a definite structure and spatial arrangement in the Saleh model, with their relative positioning shaped by electrical interactions between charged constituents. Changes in particle number and arrangement can accordingly produce changes in nuclear size, shape, and density. The relationship between particle number, arrangement, and nuclear size therefore offers an independent test of the Saleh model's capacity to describe the structure of the atomic nucleus.

Conclusion

The Saleh model examines the structure of the atomic nucleus from a different perspective, emphasising the neutron's internal structure, the arrangement of protons and neutrons, and Coulomb interactions between charged constituents. Ten significant arguments have been presented within this framework — concerning nuclear structure, order in particle arrangement, neutron behaviour, the weak and strong nuclear forces, radioactivity, isotopes, nuclear stability, binding energy, the proton-to-neutron ratio, and nuclear size — as grounds for evaluating the validity of this model.

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