



Discrepancies with the Recent Models of Nucleons

ICCF23 2021 XIAMEN, CHINA

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Experimental Measurements of Quark Mass

- ▶ Experiments found the mass of the three quarks make up only about 1% of the proton mass.
- ▶ Similarly for a neutron.
- ▶ Unexpected finding.
 - ▶ New models of nucleons have been proposed.
 - ▶ Attempt to explain this missing 99% of the mass.
- ▶ However--These new models contain many misconceptions and mistakes.
- ▶ The new models typically claim one of three concepts....



Concept one: Binding energy makes up the missing mass.

- ▶ The models claim that the binding energy holding the quarks together inside the nucleon has mass.
- ▶ This claim is related to the relativistic energy/mass equivalence, $E=mc^2$.
- ▶ Thus, the binding energy mass makes up the missing 99% of the mass.
- ▶ The problem with this claim is a sign error when accounting for the binding energy of the quarks inside the proton.

Concept One: continued

- ▶ Regardless of what type of energy, binding energy must be subtracted from the mass of the unbound components.
 - ▶ This is true for all types of energy--quantum, electromagnetic, gravitational.
 - ▶ This is true for any stable configuration.
 - ▶ This sign error creates a significant problem with these models.
 - ▶ A blatant violation of thermodynamics and conservation of energy.
- ▶ Particles held together by binding energy are in a lower energy state than the individual particles. We know this because...

Concept One: continued.

- ▶ When a bond is formed, energy is released to the external environment.
- ▶ To break a bond, an external energy must be added to the configuration.
- ▶ Thus, the bound particles are in a lower energy state, and at a lower mass.
 - ▶ Energy and mass are equivalent, and can be thought of as just different units; if the energy goes down, the mass goes down.
- ▶ Quantum physics does not claim to violate conservation of energy.
 - ▶ Quantum uncertainty can violate it for an extremely short duration of time.
 - ▶ Long term violations are not allowed.
- ▶ Summary of Concept One: Seriously Flawed.

Concept Two: Relativistic Mass Inflation makes up the missing mass.

- ▶ This concept claims that the three quarks are moving at extreme relativistic speeds with large amounts of kinetic energy.
- ▶ This relativistic speed inflates the mass of the quarks.
- ▶ This mass inflation makes up the missing 99%.
- ▶ In order to get this much mass inflation, the quarks need to go 0.99995 the speed of light.
- ▶ If the quarks are moving that fast, they would instantly be hurled out of the nucleon.

Concept Two: continued.

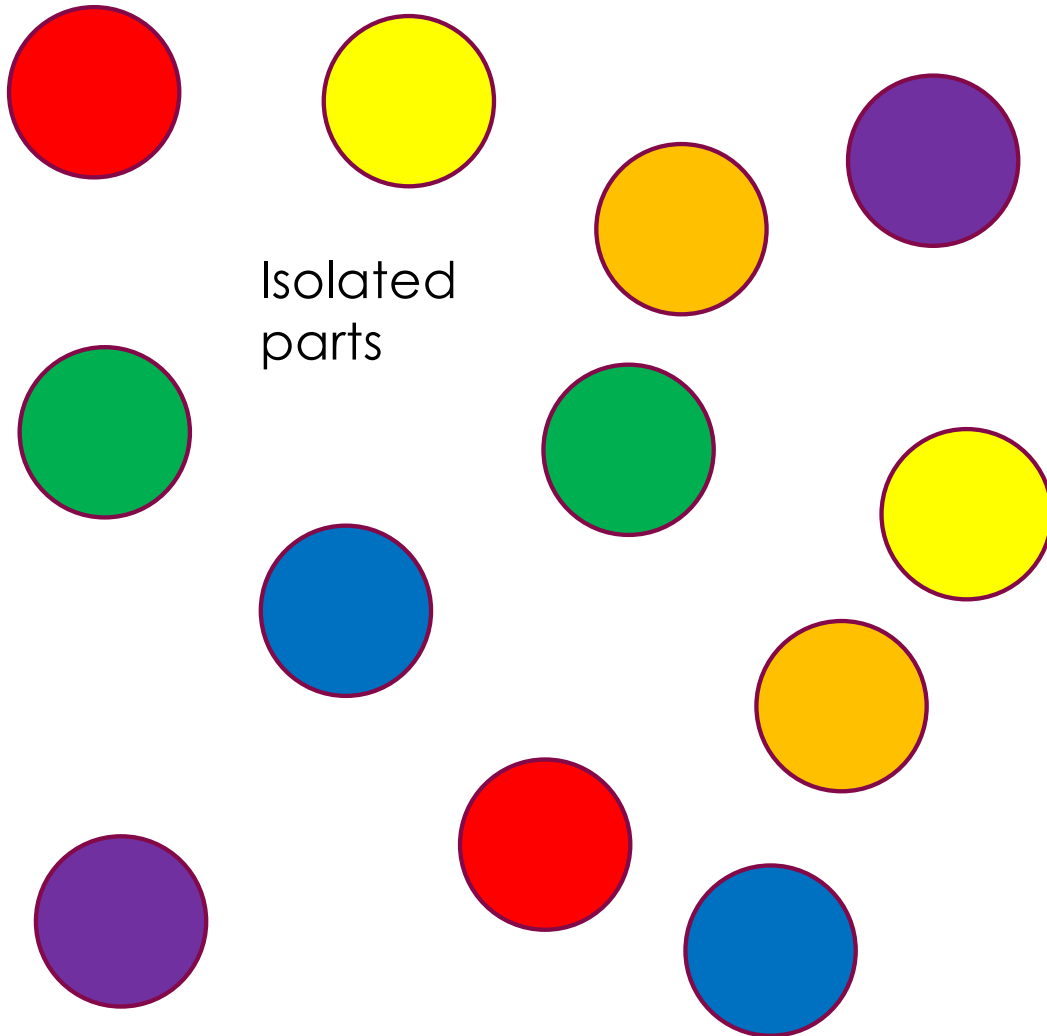
- ▶ This problem can be resolved only if the binding energy is stronger than this excessive relativistic mass-inflating energy.
- ▶ The relativistic mass-inflating energy competes against binding energy in a tug-of-war.
- ▶ It does not add to it.
- ▶ For the proton to be stable, the sum of these two conflicting energies must produce a net mass that is less than the mass of the individual parts.
- ▶ Summary of Concept Two: Seriously Flawed.

Concept Three: Hundreds of extra quarks make up the missing mass.

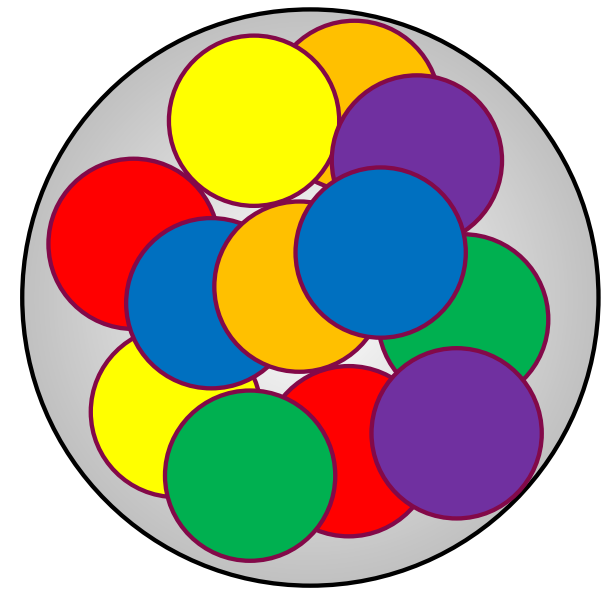
- ▶ The addition of hundreds of more non-valence quarks.
- ▶ All of these hundreds of quarks violate the Pauli Exclusion Principle.
- ▶ And violate the Heisenberg Uncertainty Principle as well.
- ▶ The addition of hundreds of non-valence quarks into the proton violates the very foundational pillars of Quantum Physics.
- ▶ Summary of Concept Three: Seriously Flawed.

Conclusions

- ▶ Nucleon Models are the building blocks for Nuclear Force Models.
- ▶ For a better understanding of nuclear physics—and in particular for LENR—nucleon models must be free of blatant violations of:
 - ▶ Sign errors.
 - ▶ Thermodynamics.
 - ▶ Conservation of energy.
 - ▶ Modern physics.
- ▶ When trying to account for the nucleon masses, the new models are severely flawed and unacceptable.
- ▶ These models should not and cannot be endorsed as correct.



Isolated
parts



Bound object
made of composite
parts