An Alternative View of Nuclear Structure: The Size of Nuclei

Aran David Stubbs

Abstract

This is a description of an alternate to the standard models of nuclear structure, with a crystalline structure of diquarks and monoquarks. Nuclei were found to follow a least surface function, modified by minimizing the dipole on the nucleus. It assumes a structure to the quarks based on a theory of gravitons as low-energy tachyons, with a photon-like shell surrounding each charged structure, and each monoquark containing a proto-quark in a spherical orbit just above a pair of gravitons also in spherical orbits, with the diquark being a proto-diquark above 2 gravitons. Other fundamental particles (photons and leptons) are also proto-matter above gravitons.

This theory provides a diameter of the proton of 1.6075 fm, and minimum base frequency of the graviton of 4.148×10^{42} cycles per second. It contains a brief analysis of the energy and size of some other nuclei.

Main Article.

Other Nuclear Components

From examining the next layer down, a more complete view of the nucleus is possible. An analysis of the constituents of the various quarks and leptons leads to a 5 or 6 piece monoquark (with a proto-quark at the surface, 1 or 2 proto-photons depending on the charge, a white diquark just above, and 2 gravitons just beneath). Similarly, the diquark has 6 pieces (3 proto-diquarks: 1 bicolor & 2 white, a proto-photon, and 2 gravitons). When the charge has migrated to the overall structure, the nucleus also includes photon-like structures around the various charge surfaces with a pair of gravitons topped by 3z proto-photons (6 for Helium, 3 for Hydrogen, 1 for a wild Down quark, etc.). These act to contain the nucleus. See also the fuller analysis of the photon-like structures. Downs and interior diquarks have their charge at the quark level, so the proto-photons are included in their primary structure. There are 3a proto-photons total among the charge surfaces and the individual down/diquark pieces. Similarly, there are 3a white proto-diquarks based on the color bits for each nucleus. If a nucleus had net color, some of these would be at the nucleus level, rather than in the primary structure of the quarks and diquarks.

It is possible to add up all these pieces to find an overall piece count for each possible nucleus. The simplest, the proton or Hydrogen 1, has a pair of spheres encapsulated in a larger sphere. 1 interior sphere is the 4 piece up quark (both proto-photons having migrated

outward), the other a 5 piece diquark; the outer sphere is a 5 piece photon-like structure. This is 14 total pieces. The Hydrogen 1 atom also includes a single electron, which is a 6 piece structure with a proto-lepton, 2 gravitons, and 3 proto-photons. This is bound to the nucleus by another photon-like structure (again with a pair of gravitons, and presumably a sextet of proto-photons). The various pieces of the proton are in 1s, 2s and 3s orbitals, with an effective piece count (simplified to the energy of the 1s orbiting wavicles in the smallest sphere – the diquark) of 15: diquark's gravitons (1s) 2@1 units each, diquark's proto-diquarks (2 2s, 1 3s, 2@2 units & 1 @3 units), up quark's gravitons (1s) 2@1/2 unit each, up quark's proto-up and proto-diquark each 2s: 2@2/2 units each, photo-like shell's gravitons (1s) 2@1/3 unit each, proto-photons (2 2s, 13s): 2@2/3 units each & 1@3/3 units each.

The Helium 4 case is only slightly more complex: 2 monoquarks (ups) at 4 pieces each, 2 monoquarks (downs) at 6 pieces each, 2 diquarks at 4 pieces each, 2 diquarks at 5 pieces each, and a photon like structure with 2 gravitons and 6 proto-photons. 46 total pieces, with a normalized piece count of 64.09. Many other small nuclei also have all surface spheres equidistant from the center, but beyond Oxygen 18 these end.

Calcium 40 has 24 surface monoquarks and 24 surface diquarks in 8 triangles of 6 spheres each. 3 of the 6 spheres of the triangle are closer to the center of the nucleus, the other 3 are further. This gives Calcium 40 2 "charge surfaces". Each charge surface is surrounded by its own photon-like structure. 4 of the central surface monoquarks are downs, so the net charge among the 24 spheres at that distance is 8 z-units, or -24 times the traditional charge on a down. The inner charge surface then has 24 proto-photons above 8 gravitons. The outer charge surface has its own 12 z-units (with all 12 monoquarks as ups), plus it contains the charge from the inner surface so there are 60 total proto-photons and 18 more gravitons. This gives a total piece count for the nucleus of 490 pieces. Some of the larger nuclei have piece counts over 2000.

From the piece count it is possible to get an energy profile, which is equivalent to a size. For the proton, the 5 medium pieces are half the energy per piece of the 5 smaller, while the 5 largest pieces are a third the energy per piece of the 5 smaller pieces. Calculating P as the sum of the pieces normalized to equivalent energy, we have 15 piece equivalents. With 17.185 MeV rest mass (calculated from the "rest" energy of the charge and color bits), the 5 small pieces are each 61.406 MeV (so the 5 large pieces are each 20.469 MeV and the 4 medium pieces are each 30.703 MeV). This gives a diameter of the diquark of 0.53583 femtometers, or a diameter of the proton of 1.6075 fm

With larger nuclei the assumption that all pieces are equivalent in size fails. The interior spheres are bound to 6 other spheres. This gives them a lower energy per piece, hence a larger size than the surface spheres. The presence of multiple charge surfaces increases the total energy content of the nucleus leading to both the reflective symmetry (to minimize the count of such), and the fluffiness (moving charge outward). Cases with residual dipole probably have some extra proto-photons for electric dipole, or white proto-diquarks for chromatic dipole, not calculated as of yet. Approximating around these problems, sizes for several additional isotopes (and such) follow:

Isotope	Structure	P (Standardized Pieces)	E/P (MeV)	Diquark Diameter (fm)	Overall Diameter (fm)
Charged Pion	Sphere	16.00	8.48	3.876	3.876
Neutral Pion	Sphere	6.00	21.86	1.504	1.504
Hydrogen 1	Pair: E-1-1L1	15.00	61.41	0.536	1.608
neutron	Pair: E-1-1L1	18.00	51.24	0.642	1.925
Hydrogen 2	Diamond: E+0-1L1	31.12	59.16	0.556	2.224
Helium 3	Hexagon	46.64	59.11	0.556	2.398
Helium 4	Double Tetrahedron	64.49	56.73	0.580	2.580
Lithium 6	E-1-1L2	96.00	57.28	0.574	3.445

References

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