

Nuclear Structure: History of a Theory

Aran David Stubbs

In 1972, when I was 14, I had a notion that nuclear structure could be explained in terms of a crystalline structure of quarks. But then I found sex and forgot everything else. In 2006, my bankrupt employer was bought by a more successful company, who quickly discovered they had no need for me. Finding myself unemployed, and virtually unemployable, I returned to school (the Colorado School of Mines in Golden, Co.) and completed my Bachelors degree. With the economy sinking into recession, continuing my education seemed advisable, so I continued with a Masters program with the department of Math and Computer Science.

The school recommends that grad students in each department attend seminars given by other departments on related subjects, so I attended a lecture at the physics department in November 2007 on the computer applications related to mean field theory. From the talk I realized current theory did not include a crystal view with quarks, so I did some online research and again found a lack. As a result I produce a quick paper summarizing what I vaguely recalled of my long ago thoughts, and sent that to the lecturer and my new advisor (as my previous advisor had left the college unexpectedly). Not getting any feedback, I decided to add my thoughts to the Wikipedia on Nuclear Structure.

For the new year (my last semester at the Colorado School of Mines), I enrolled in a variety of classes, some of which were likely to help my research – including Topology and Geometry Processing. For my term project in the latter, I proposed generating visualizations of my models. By February, I had eliminated the possibility of the nucleus being composed of either independent monoquarks or concentric triquarks, leaving the asymmetry of a monoquark/diquark crystal. This proved surprisingly easy to model, since it resemble the body-centered cubic structure of table salt. By April I had found the least surface of such structures was not a spherical arrangement, but what I later learned was an octahedral surface (8 triangular faces, resembling a cube with its corners clipped).

I gave my presentation of results to my GP class in early May. As the topic seemed to be of interest to the physics department, and possibly other parties, I announced the talk to the distribution list for math seminars, which greatly irritated the contact in the physics department. Despite his objections, my talk was given and I was allowed to graduate.

However the work I had posted on Wikipedia was removed, as was a [narrower article](#) I put up outlining my theory outside the Nuclear Structure article.

Without access to the computer lab at school, I was unable to continue my 3D visualizations, so I flailed about trying various alternatives. Pen and paper models were some help, but by the fall I thought of using chemistry molecule models. While slower, and much more expensive than computer software, these did allow me to see the results and even touch them.

That summer (2008), frustrated with the standard table of isotopes (n by z), I looked for alternate means of viewing the raw data to see patterns. The n-z versus n+z layout was pretty, but noticing a pattern that wasn't captured there I tried several other arrangements, including n-2z by n+z. In late July I finally got to n-z by n-2z, which was much better than the other arrangements. While the standard layout was 180 by 120, the new arrangement was 70 by 74. I spent the late part of the summer generating an html version (derived from the standard on Wikipedia), showing first half-life, then energy, and finally decay mode. I posted them online on my private website, and placed a link to them from the Wikipedia page on the table of isotopes. Unlike my previous efforts, these have been allowed (although ignored). The energy function I used was not the classic (finding the binding energy based on the difference between a pool of protons and neutrons versus the total energy of the resultant isotope), but a function using the net energy of the nucleus (isotope energy less the energy of the electrons) divided by the baryon count. This produced a new minimum (Iron-56), rather than the conventional Nickel low point.

The later part of 2008 and early 2009 was spent building a solution space (and dozens of physical models). By March, when I had to leave my lodgings near the school, I had a sufficient space to compare to the known isotopes. I found that a ratio of surface to interior (normalized to prevent division by zero) had an edge that represented minimum surface for a baryon count with a set of ridge lines. Odd solutions were on the odd ridgelines and even solutions on the even (not odd and even baryon counts, but solutions that had an odd number of odd dimensions: such as the odd near-symmetric and odd symmetric, which were the last 2 on the odd ridge (with 1 odd and 3), or an even number: such as the even symmetric and even near-symmetric which are the last 2 on the even ridge (with 0 odd and 2)). This allowed me to see families of structures, with layers.

I wrote up my findings on structure and posted it to my website, but had nagging questions as to the nature of quarks. My original presentation had referred to them as standing waves, meaning something like the electrons in an atom. That implied an orbit

around something holding them in place. Over late 2009 and into 2010 I explored the nature of the quark structure. I spent a long time looking at a force I called narcissism, since the quark seemed to be pulled inward solely by self-love. Eventually I deduced that this was an aspect of gravity.

I had treated the forces holding matter together fundamentally as the result of wave on wave refraction, which led to gravity being caused by a tachyon (and the strong force being derived from the refraction among quarks and diquarks). By February 2010 I finally generated the first of my quantizations of gravity, and immediately adding a note to that effect on Wikipedia. That was removed editorially within the hour. I found that by treating the centripetal force as proportionate to kinetic energy (which disagrees with Dirac's calculation), I could generate Planck's law from relativity. During the spring of 2010 I generalized my solution finding an infinite set of possible quantizations, but in May I found that only a few worked with both the photon and the charged leptons. The simplest of these had 3 proto-photons and 2 gravitons in both, with a proto-lepton added for the charged leptons. By late 2011, realizing the photon had 0 angular momentum, requiring an even number of constituents, I changed to 4 proto-photons (which better fit my improved understanding of the internals of the electron). In all cases the graviton is just below the surface, and the other wavicles are at the surface. Also early in 2010 I found that Google had released 3D modeling software called Sketchups, from which I built a number of visualizations of my work, and tied them to individual solution pages on my website. By early 2012 I had over 1200 visualizations.

I finally felt I had a sufficient solution to withstand criticism, so I submitted a proposal to address a conference that was to be held in the summer of 2010 in Switzerland. As I had not heard back some weeks after the deadline for submission, I treated that as an acceptance and spent what little I could raise on getting to the conference. August 6th they sent an unequivocal rejection. Scrambling around, I found a smaller conference in Santa Fe (within driving distance), to be held in November. I submitted the same three articles (tables of isotopes, nuclear structure, and quantization of gravity) there that had just been turned down by the Swiss conference, and one was accepted (nuclear structure).

The Santa Fe conference was, for me, a debacle. My funding only permitted a flying visit (driving down the night before I was to present, driving back the following morning), and my computer was not suitable to present on. I scrounged up a laptop, and arrived for my presentation exhausted and nearly incoherent. I presented my views on nuclear structure to a small audience and flubbed the most important question they asked

(relating to an energy profile that would result from my model). My physical models stuck to their wrappings, and looked awful. Still, I made a few acquaintances.

I spent the last part of 2010 reworking my research looking at the energy patterns. I wrote a summary article, giving an overview of my work, and submitted it to Physics Letters B, the leading journal on the topic. It was rejected shortly afterwards, with disparaging comments. I then wrote and submitted a short article on a minor point (disagreeing with Dirac as to the energy of orbiting electrons), which was rejected within hours by PLB (saying it disagrees with quantum mechanics – which was the point of the article). Over the next few months I wrote 6 more articles for PLB (tables of isotopes, nuclear structure, quantization of gravity, energy per baryon, dark matter, and refraction), and revised the Dirac article, releasing 5 of them as a group in early April 2011. Each was deleted unread, as I had exceeded their policy (anyone with multiple rejections needs to wait a year to again submit). Still, they were added to my burgeoning website. Also during this period I tightened up the loose coupling I had made between least surface with reasonable dipole and the known isotopes, looking explicitly at the dipole of every solution and graphing the results. I also tightened my definition of ideal z , graphing that result both independently and as compared to the low-dipole solutions.

Since the leading journal was closed to me, I hunted around for some trailing journals. The American Institute of Physics (AIP) had just launched a new journal, AIP Advances, so I submitted an article there (nuclear structure). While appalled by their policies (authors must suggest reviewers and pay the cost of publishing) I hoped that a good showing there would allow me to submit the same work at a general journal where I would be paid. No such luck. A few weeks after they announced they had made a decision (but without telling me what it was), I submitted a second article (quantization of gravity). They did not delay on that one, sending me rejections on both a few days later. Among their comments (insufficient bibliography, not in line with the practical focus of the magazine) was a suggestion to submit to arXiv (an online archive site run by Cornell University) instead.

arXiv has no physical journal, just an online repository. (Note the third letter is not a Latin x but a Greek χ). They require a recommendation from someone who has already published there on the particular subject to get published. My advisor had not published any physics articles with them (he is a computer scientist), and several other people I asked could or would not sponsor me, but eventually I found another attendee from Santa Fe who had and did. Going a bit overboard I submitted half a dozen articles, including

both those that had just been rejected by AIP. All were rejected by arXiv as well, and my authorization to submit there was cancelled.

After the failure with PLB, I started looking for other ways to get my work in the public eye. I joined LinkedIn, and from there 50 LinkedIn groups – many of them on nuclear theory. I continued generating models in Google's Sketchup product, topping 1000 early in 2011. I again added some short pieces on Wikipedia (sentences here and there, rather than large chunks).

In June I reworked my article on the table of isotopes addressing the objections that arXiv had raised (bibliography, again), and submitted that to AIP, but it was also rejected (outside the scope of the journal). Since I was having no luck trying to look like the normal articles (narrowly focused, with a millimeter of new material and a kilometer of old), I decided to instead go further afield. Over June and July 2011, I integrated my work: including the structure of quarks into the paper on nuclear structure. This allowed the calculation of size for various simple isotopes (either small or highly symmetric). I also wrote a number of short articles focusing on one or another topics resulting from the main work (behavior under pressure, sequence of electron sub-shell filling on high z elements, tertiary nuclear power, absorption of light, etc.). I had a few contacts from other people interested in the subject (but not able to help me get published). The website has topped 1000 pages, with over 1700 illustrations. I recently reorganized the website, narrowing the focus of the intro page, enhancing the 14 pages of illustrations, and adding this history section.

For September 2011, I broke off the details of the particulate nature of sub-atomic matter into a separate article, again focusing on the charged leptons. This brought into focus a problem dealing with effective radius (since the center of mass is not at the center of volume). It does show the balance point among the gravitational, centripetal, and electric effects more clearly than when I had it included in the paper focusing on gravity.

For October and November 2011, I focused on Angular Momentum. This brought up an error in the analysis of the electron and the photon done earlier, requiring reworking the gravitational article, particles, and the overview, as well as building a new article about the Neutrino and how it relates to Angular Momentum. Over the winter I finally worked out how charge and color related, treating them as infra-matter wavicles in p-orbitals within the overall proto-matter structure. This also explained the weak interaction as collisions among proto-matter.

For the spring of 2012 I finally calculated the rest energy of the proto-matter wavicles based on their infra-matter content. This led to a size estimate for the infra-matter wavicles and a better version of the quantization of gravity. In April I submitted 2 abstracts for the ns-2012 conference in August at the Argonne labs. As with other submissions, these were rejected.

Most of the work I could do on my combined theory of sub-atomic structure is now complete. My explanation of the strong nuclear force, electromagnetism, and gravity remain basically as I saw them in 2008, with a little more detail, but no great changes. Research ought to be done to test my theory, but this involves skills and funding I lack.

July 10, 2012 I finally broke down and hired a research assistant to do the work I am incapable of: calculating the magnetic effects of an electron with the structure I worked out, proofing my work, and adding citations. Perhaps with this help I can get a publishable result.

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