1 An introduction to the dimensional boundary chord model

1.1 Background

The *dimensional boundary chord model of the nucleus* is an attempt to look at the world around us in a slightly different way. It is not a real theory yet of course, but it does try to stay firmly within the bounds of reason, although as with any new idea; especially during its infancy; there will always exist a certain element of speculation until proof can be found through observation and experimentation. As briefly mentioned in the preface, there will be two main themes running through this model; a new description of the nucleus and a re-definition of the waves, both of which will be seen to have a dependence on simple dimensional components. It will also be argued, that our own origin within what is so often referred to as the big-bang, was but the latest in a series of events that punctuated the early evolution of the universe during an initial period of *dimensional differentiation*. The boundary chord model will try to deal equally with the very large and the very small.

The atom seems to be a 'dividing line' in terms of how we describe the world around us and could perhaps, be defined as marking out the difference between these concepts of the very large and the very small. It seems to sit just this side of an invisible boundary that lies between what we can and can't see, while climbing up a scale; the molecule appears to more readily submit itself to detailed examination. There is still considerable debate as to the atom's nature, especially when one considers its nucleus. Does it remain the classic 'point' particle, or is it and its supposed constituent parts more akin to 'string' vibrations, resonances or wave functions?

Whichever definition one is drawn towards, the atom appears to comprise a system of inter-related parts and the nucleus itself continues to resist most attempts at unravelling its detailed description. The quark model for example (see *Figure 1.1.01* above), is still far from ideal and continues to exhibit many shortcomings and the quarks themselves, appear to be the most stubborn of individuals. They continue to defy examination and are perhaps the least responsive to probing of all the sub-atomic particles.

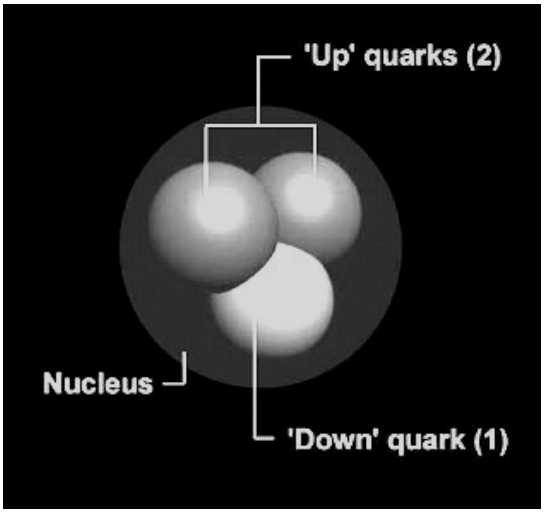

Figure 1.1.01 *A simplified model of the conventional hydrogen nucleus (the proton), with its two 'up' and single 'down' quark.*

In their book *'The Second Creation'* by Robert P. Crease and Charles C. Mann[1]; in *'Killing The Hydra - Part II'* (page 335), the authors include what is a rather poignant paragraph describing the nature of these animals and I quote:

"One can speculate endlessly about whether there are particles that can be subdivided infinitely. Quantum chromodynamics does not pretend to answer the question. In the manner of science, however, it does provide a definite answer to what happens when you actually go out and try to do so with the basic components of our world, hadrons. Suppose you begin shooting electrons at a proton, trying to knock loose one of its constituent quarks. As the quark is kicked further away from its partners, something strange occurs; the virtual gluons whirling between the quarks begin exchanging gluons among themselves. The greater the separation, the more intricate and powerful the web of interactions. Eventually, the

energy needed to separate the quarks still farther from the snarl of gluons becomes sufficiently great that a new quark-antiquark pair is created ex nihilo from the vacuum. The anti-quark bonds to the quark separating from the proton to create a meson; the new quark meanwhile pops right back into the proton, leaving it with the same number of quarks as before".

The boundary chord model on the other hand, will attempt to argue the case for a nucleus that is drastically different in character to that illustrated above. This new description of the atom's core can be thought of as comprising a series of ***rotational groups*** - and it will be these that provide the nucleus with a mechanism more readily able to produce the phenomenon of mass and the concept of charge that nature seems to have bestowed upon it (see *Figure 1.1.02* shown below).

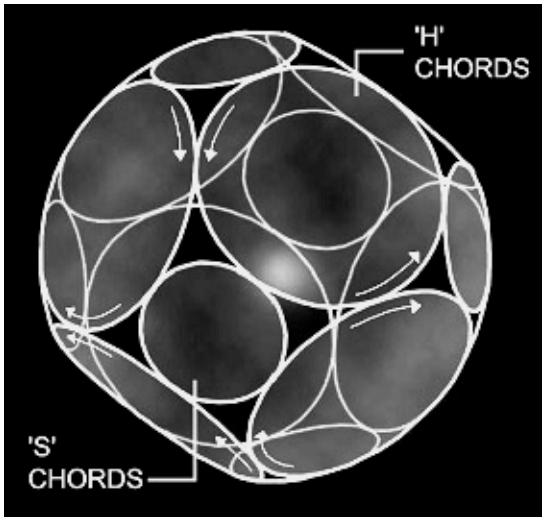

Figure 1.1.02 *The nucleus within 'The Boundary Chord Model' can be considered as comprising a total of seven 'rotational groups' that provide all the characteristics previously attributed to the quarks.*

These rotational groups will be seen to be the result of a condensation of string energies from what will be called ***tri-planar coordinates*** and as such, each of these group component will be a combination of *THREE* fundamental strings. This, it will be argued, would have involved the afore mentioned period of dimensional differentiation during an earlier epoch within a young, embryonic universe - *prior* to what is affectionately called the big-bang. Rotation within these components, will itself be due to the effects of what can be called ***face-spin bias*** - or a momentum that has also been carried over from an earlier episode of differentiation. It will be this rotation, or more correctly; a difference in the rotational speeds of these components, that not only provides the effects of induced inertia and thus mass - but also the very real concept of charge within the nucleus. It will have been a rather subtle and inter-connected series of events that would ultimately result in the cosmos we witness today.

1.2 Is it necessary?

As with any new idea, the first obstacle to overcome (and it is an enormous one), is to try and provide a convincing argument as to its possible worth in the first place - and this is not an easy task. As outlined in the preface, I had received some quite poignant criticism regarding my motivation and would ask to make the time here to respond to some of those remarks. One's first line of defence would be simply to say "why not", but as I said, this kind of response didn't address any of the points I was particularly trying to make. Perhaps the most frequently asked question has always been "why" have I produced this work in the first place and what is it setting out to achieve?"

This also all boils down to that rather important question of "is it necessary?" and to try and answer this, I would first quote some comments made by Brian Greene in his splendid book *The Fabric Of The Cosmos*[2], where in Chapter 12, *The World On A String* (page 353); he says:

". . . Why do the elementary particles have just the right properties to allow nuclear processes to happen, stars to light up, planets to form around stars, and on at least one such planet, life to exist?" (Greene's italics).

There is no doubt that one answer to this question is simply "because they do", but this is not only defeatist, it completely ignores the question in the first place. One has to be careful however and it is clearly all too easy to allow speculation into the conversation. Continuing this very fundamental of themes into the dimensional aspect of creation, on page 366, Greene comments on the initial idea that gave rise to the possibility (or perhaps probability) of more than the usual four space-time dimensions, first postulated by Theador Kaluza in 1919 and later to become Kaluza-Klein theory. Again I quote:

". . . Thus although it was a great discovery in its own right, it lacked a sense of inevitability. If you asked Kaluza or Klein why the universe had five space-time dimensions rather than four, six, or seven, or 7000 for that matter, they wouldn't have had an answer much more convincing than why not".

The dimensional boundary chord model does not in itself, come out of what Greene calls inevitability. There has and always will be, a problem with acceptance when trying to enter the realms of established convention; for if there isn't any apparent need, why bother at all; or is it really as straight-forward as some would have us believe.

There currently seems to be signs of growing unrest within the theoretical community, focusing around the promise of super string and M-theory that would not now, seem to be living up their earlier expectations. A recent article in the *Times* for example (22nd June 2006), entitled *"Just as you've solved every problem in the Universe, the string breaks"* (by Anjana Ahuja) - reviews Peter Woit's[3] book *'Not Even Wrong'*. In this review, she comments on the current lack of progress within this branch of theoretical physics. Perhaps a new appraisal of the situation wouldn't go amiss after all - and in her review, Ahuja writes:

". . . Now Woit has turned his thoughts into a book of the same title. It attacks not only the lack of experimental evidence for superstring theory, but also argues that it has crowded out other worthy research. Its dominance, he thunders, means that even superstring sceptics, if they want a career, are forced to worship at its alter."

This particular offering is but an introduction. It is far from mathematically complete at the moment and I would be the first to concede the fact that it may well contain shortcomings that will need to be addressed as this perspective matures. It will attempt to argue that there is a less complex alternative of looking at the fundamental building blocks of nature - and in a way that has not yet been seen before. It will also try to argue for an origin and an evolution that includes a multi-dimensional aspect that in itself, is quite simplistic and *inevitable*. Perhaps one the most drastic claims of this model, will be its lack of dependence on the quarks, whose previously assumed function within the atom, can now be represented by this model's rotational groups instead.

1.3 The tetrakaidecahedron

It should soon become clear that the boundary chord model also involves a fourteen-sided polygon called a ***tetrakaidecahedron*** and this object seems to fit any role I ask of it. In this context, it becomes indispensable and provides an explanation for the appearance of matter, the end of inflation and the evolution of the expanding universe in which we live. It becomes the reason why the proton and the neutron have evolved in the first place and why we are here at all. It governs the placement and function of the atom's electron shell and has thus determined the synthesis of the elements.

Together with what will be some very simple inherent rules within the dimensional boundary chord model itself, the tetrakaidecahedron becomes a major player in the way that the elements bond (either covalently or ionically) to form the compounds and molecules we take so much for granted today. The continued use of the word was becoming somewhat of a mouthful,

especially in conversation, so I attempted to shorten it to 'TDH' or something similar, but this didn't really help. The abbreviation 'TD' seemed better and phonetically speaking, this soon became *'**teddy**'* - and so it doth remain. It is used a lot throughout this entire submission.

As mentioned at the start of this submission, this evolution will also be seen to involve a new definition of the waves (or ***dimensional boundary surface wave*** phenomena) and because wave motion and its propagation will be an important consideration when discussing the dimensional boundary chord model, this subject will need to be introduced as early as possible. There is a problem however and this has everything to do with just how the waves can be defined within this model. There are some important dimensional implications to consider first and what was originally planned as Chapter 2, *(Dimensional Boundary Surface Waves And Their Mode Of Propagation)*; will really have to be left on the back-burner for the moment, because it would be difficult to do it justice without first introducing what I believe to be a fundamental relationship between evolved dimensional components. The result of this evolution provides not only the mechanism for electro-magnetic wave propagation, but also the reason why there appears a duality within this phenomenon in the first place. We will therefore, need to explore some dimensional implications next.