Alan Guth's *The Inflationary Universe*

How did it all begin? How will it end? Are there more possible outcomes for the basic structure…of everything? What is the engine of design and creation? Can the micro be demonstrated in the macro, and then, what is the relation and mechanism of theoretic demonstration? I could go on. This book asks, and then answers, so many impossible childish questions! Yes, childish. The very most worthy and interesting minds are children with slide-rules, intellects which demonstrate the dual nature of play as it meets with experimental rigor. The most interesting people are like children—they can and will, imagine anything—perhaps, even the truth. One must look with new eyes to see anything so childish as a new idea, a fresh thought perfectly hidden.

It seems that physicists are people too—even cosmologists. Alan Guth was an unwilling cosmologist, and brings us a surprisingly intelligible and information rich account, often told in dramatic and human terms, of his mental journey and the resultant insight, which has changed the way we view everything. Now…it makes sense. I am unable to afford many expensive books, and this book is old, from 1997, purchased used at a library book sale like most of my books, but the knowledge in it is fresh! Alan Guth is an accessible writer and speaker, and one can view a few of his lectures on You Tube. He sounds just like his book reads. OK, so he's twice as smart as me or you, but what a nice guy! No pretense—at all! He probably is not so much fun at parties as Feynman was, but like my favorite percussive physicist, he has that infectious happiness which makes his ideas easy to grasp and invites you into the most ridiculous and impossible worlds! Perhaps these ideas, although quite ridiculous, are real, and the math is right, the experiments correct, and these ideas do describe what they can not—our world. Look at the data! What a nice fit! Gorgeous! Coincidence? It might just be possible that…

Gravity is not only attractive as one imagines but also comes in another form, which manifests as a "false vacuum." This phenomenon is unusual in that it decays exponentially, and yet, expands at an even greater rate. By introducing an inflationary pre-history into standard big-bang cosmology, conditions are met so that informational exchange is guaranteed across the plethora of events which accounts for the *uniformity* of the currently observed background radiation; inflation accounts for the seemingly impossible precision of the delicate cosmic balancing act known as Omega; inflation accounts for the form and structure of the now observed subtle *divergence* in the uniformity of the background radiation, and generally, makes sense of a pile of what seemed anomalous data. Now, there is a simple unified explanation for what were many separate complexities. The connectivity of it all is stunning! Imagine, a hypothetical mechanism, a theoretic bit of microscopy if you will: the idea of Planck scale quantum fluctuations, so bloody impossible to imagine—the scales so minute—the Planck length (via physicist Brian Greene): if an atom is increased in size to mirror *the known universe*, proportionally, the Planck length is as a tree—quantum fluctuations on this tiny scale now mirrored via inflation in super macro structures on monstrous cosmic scales—sub-infinitesimal quantum fluctuations now inflated, increased to be astronomically huge in dimension! Look—sub-atomic quantum mechanics—in the sky! That is Alan Guth. A child genius. He may be right too.

If so…can you imagine this?— As the false vacuum expands more rapidly than it decays, when viewed outside of the process it initiates, the result is inevitable—it must be an eternal process. The false vacuum expands, but maintains its energy density! This seems impossible to me, but let us follow along and see what happens, after all, the child genius is more interesting than my objections, so let us see. The false vacuum is able to accomplish this thing, in the simplest terms, by turning inside out, which occurs due to a developing wormhole, and then, the expanding false vacuum creates *new space*—naturally. Hahahahaha! Child's play! Now, the real vacuum adds to the expansive energy of the false, and we have created: creation! The result is a model of universal creation in a literal sense. Inflation must be ongoing, as false vacuum expansion outpaces decay, and so, there may be an ever present process of universal creation, each universe like our own but a pocket universe, each created, then the next, then the next, infinitely—*a fractal genesis!* (P. 247) Perhaps the steady state model and the big bang need not be at odds?

And then this!—As each universal instantiation of the theory comes into being, the field energy density in each case need not be the same. This means, as the Higgs fields determine the masses of particles, that those other universes need not be composed of matter with properties like those we can measure in this universe! I infer, the renormalization in current quantum theory may be a necessity, as the particulars of observable particle properties are not derivable as endemic, but are a function of systemic conditions. Perhaps, the properties of particle interaction and physical description are necessarily a particular which need be measured in each case. And lastly, the most clear and compelling reason to recommend this fantastic book: it makes an old mind, think new thoughts!

Here, have some new silliness! What is dark energy? Do I know? I do not know if I know or not! No one does, but Dr. Guth has introduced me, and now, I might just have found it! His lecture stitched the ideas in place. To account for the ever increasing observable expansion of the universe, the notion of dark energy was introduced—a physical mechanism and substrate akin to the cosmological constant. Dark energy then, is like a dilute false vacuum. Here is how that might evolve: I would like to reorient your perspective, and ask you to think of gravitation in terms of space, not mass. A gravitational field then, is a field which gathers mass into it, and a false vacuum as construed above, is an anti-gravitational field which repels mass from its area. Now Dr. Guth has stated that as it expands, the false vacuum never looses energy density. I wish to introduce into the discussion, the ideas of the weak force, and beta decay. The weak force has demonstrated broken symmetry, parity symmetry was broken in beta decay. An energetic field creates the false vacuum, and such a field creates particles and virtual particles which are but energy. (Those particles are really manifestations of the field itself). I propose: if those particles, which are but the field, are subject to weak decay, the field will break symmetry and loose energy. Dr. Guth has stated that false vacuum decays much like radioactive decay (p. 246). If so, then perhaps although at small time scales, the false vacuum does remain exactly stable as to its energy density during expansion, if we add great measures of time, and so, *increase the probability of weak*

interactions, the field may then, lose strength and adjust its energy density slowly downward. Now, the symmetry between dark energy and false vacuum is revealed: they are identical, only time and the weak force have created the seeming disparity. To observe the dynamic close up, energy density is conserved, but the energy density is not conserved when all expanding pockets are accounted for on the largest scales of time and distance. Dark matter is a piece of false vacuum, anti-gravitational energy filling space, which has undergone a reduction in field strength via weak decay. On a purely conceptual level, the idea could be condensed as follows:

Where F = Field strength of false vacuum, T = Time, RWD = Rate of Weak Decay, and DE = Dark Energy; the equation for dark energy formation as a function of the weak interaction with false vacuum is:

$$DE = \frac{F}{(T) \times (RWD)}$$

Or … Perhaps Dr. Guth is *correct* in his assessment of the constant energy density in infinite expansion of the false vacuum. Then, perhaps dark energy is exactly as the particle physicists have guessed, and their seemingly wildly inaccurate calculations are exactly right. String theory, and M theory, posit the existence of tiny curled up dimensions housed in specific multi-dimensional geometric shapes. If so, perhaps the reason for the disparity in observed energetic density and proposed energy density can be attributed to the specific properties of our universe, which create quite specific results that should be endemic to only THIS particular set of systemic circumstances. (Another set of energetic field parameters should create a different manifest outcome). So, as physicists postulate that the extra dimensions may be absorbing much of the actual energetic expression of the *attractive* gravitational force, so might it be with the repulsive as well. Such an "extra dimension" is simply a way things can move, and so, the manifest observable energy may be radically reduced, although it is still there, simply not there to observe, as it is being shunted off into hidden spheres of microscopically dimensioned active utilization. Perhaps *this* is the source of the apparent contradiction between the proposed value calculated in particle physics for dark energy, and the observed measurement.

I have no idea if any of this is sensible, or complete fantasy! I will find out if I can. What splendid fun to consider! New thoughts! That is the highest treasure any child can find—the ultimate shiny penny for a thinker. I love this book! It contains the currency of what is most rare and valuable—childish happiness itself! Alan Guth is as Feynman—a smiling genius and a child. He asks but one thing—*can you imagine?*

—Rich Norman © 2014