

Book Review:

Perfect Symmetry: The Search for the Beginning of Time

by Heinz R. Pagels (New York: Simon & Schuster, 1985)

- reviewed by Michael A. Aquino

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Order of the Trapezoid, Temple of Set

I suppose this could be considered one of those “Oh, geez, he’s on another of those cosmic/theoretical trips” book reviews, but honestly it **didn’t** start out that way. Having for some years been annoyed with what I can only term the idiotic insolence of the “big bang” theory [such insolence consisting of (a) the assumption that a primal *ylem*/firecracker “just happened to exist” and (b) the assumption that a cosmic match “just happened to be around to light its fuse”], I searched and searched for a cosmology which **wouldn’t** insult my intelligence and finally [in 1973] found it in Dr. Oskar Klein’s infinite-time/cyclical theory of Universal oscillation. I discussed this theory in “Genesis II” (*Cloven Hoof* #IV-7 & Appendix #57 of *The Church of Satan*) and went on to other matters. [Klein’s theory is expounded in its elegance and simplicity in *Worlds-Antiworlds: Antimatter in Cosmology* by Hannes Alfvén. San Francisco: W.H. Freeman & Co., 1966.]

Every theory has to have a hat-rack on which to hang its hat. Einstein assumed the velocity of light to be an absolute constant, and upon this hat-rack he proceeded to hang the rest of his relativity ideas. If you accept that hat-rack as a “given”, then Einstein’s conclusions drawn therefrom interrelate very nicely.

Similarly, if you accept the literal truth of the Judaic/Christian *Bible* as your hat-rack, then it is possible to derive a large body of sub-conclusions from it which all interrelate very nicely.

Similarly, if you accept an *ylem*/firecracker & cosmic match as your hat-rack, then the “big bang” theory trots along after it like a good doggie.

In short, if you can get someone to buy your **axiom**, then you’re home free, ’cause then it’s just a question of filling in the nooks & crannies. Einstein was well aware of this from the success of his relativity road-show, so decided to go for the sweepstakes: the Grand Axiom which, if he could sell, would enable him to preside over the physical re-definition of the universe. This was his celebrated “unified-field theory”. When he ran this baby up the flagpole in 1953, however, it wasn’t saluted. To this day the UFT floats in suspended animation, like Howard Hughes’ “Spruce Goose”, while onlookers try to decide whether to (a) acclaim it, (b) decry it, or (c) just ignore it.

In the case of Klein’s theory, the hat-rack was the principle (or *neter*) of **symmetry**. In its simplest sense this principle implies that nothing in the natural universe exists without a “mirror image” co-existing. Statement of this principle was not original to Klein; it was crucial to Egyptian cosmology, was [re]discovered with toots & whistles by Newton, and even acquired occult credentials as Aleister Crowley’s “0=2” equation.

The tricky thing about symmetry is that the “positive” and “negative” sides of a given substance will not necessarily appear the same. If you saw “0” suddenly “split” into a “+6” and a “-6”, it would be pretty easy to put the “+6” and the “-6” on opposite sides of a symmetrical relationship. But suppose you walked into a universe consisting of 3,1,1,4,2. You’d have to mess around awhile before coming up with $3 \times 2 = 4 + 1 + 1$... or $6 = 6$. Anyone who’s survived high school chemistry remembers the sheer terror of being presented with one side of a chemical equation, and one changed part of the other side, and being required to figure out the rest in configurations that were not molecular insanity.

If you expand your universe beyond matter and energy - for example into time and mind - symmetry becomes almost impossible to trace. Where is the “negative Michael Aquino”? Is it some weird *Doppelgänger*, with whom I may someday accidentally collide and mutually implode? Far more probably my “opposite half” is a mixture of time, mind, matter, and energy which may be scattered among galaxies and diffused over æons of time. So symmetry is one of those *neteru*/Platonic Forms which is visible and even demonstrable as a simple concept, but which quickly becomes elusive as it is carried to its ultimate implications.

An eternally oscillating objective universe is symmetrical. A “big bang” universe is **not** symmetrical, as it presupposes the spontaneous appearance of **only one side** of the equation - a sort of cosmic “horn of plenty” in which a whole lot of goodies continue to tumble out of the open end of a conical basket whose other end shrinks into a point. To my simple brain this is just so much cat shit.

So by now you’ve probably deduced why I began to wiggle my nose and wag my tail when I saw a book titled *Perfect Symmetry* on the shelf. Here, it seemed, might be the Cosmic Graal I was questing for. Is it?

No and yes. The first 3/4 of the book consists of ho-hum chapters in Physics #1A, Astronomy #1A, and Rah Rah Einstein, and I began to think I had wasted another \$18.95. But then Pagels (Executive Director of the New York Academy of Sciences) took his necktie off and got into a discussion of GUTs (Grand Unified Theories) and their implications, which is what universal symmetry is all about. There are still big holes in GUTs, the most notorious of which is gravity (which to date hasn’t been explained, much less shown as convertible into anything else). And until your GUT is complete, you can’t use it as a hat-rack.

Perhaps most infuriating to physicists [but not to Setians, who have an appropriate ace up their sleeves] is the “Catch-22” of GUTs: that human intelligence, being a component of the Master Law, would by definition be inadequate to apprehend it. In this sense, conventional physics ultimately comes around to the same hat-rack as religion: that the nature of “God” cannot be apprehended by human minds, hence must be acknowledged and obeyed as an act of faith.

Pagels is not deterred by such petty potholes. For example:

In 1968, even before GUTs were invented, Andrei Sakharov, a Soviet scientist, realized that if baryon number is not conserved, it would explain in part how the matter-antimatter asymmetry we see today could have arisen from a state of perfect symmetry. Sakharov also realized that baryonic-number non-conservation, while a necessary condition for the creation of matter, was not sufficient. Other conditions had to be met.

The first of these conditions is that the universe has to make more matter than antimatter. In order for it to do this, matter and antimatter, which are through-the-looking-glass versions of each other, have to be distinguished by some interaction that tells us on which side of the looking-glass the present universe is. Experimentalists have actually detected such interactions (they are called time reversal-violating interactions), so this condition **is** met.

Another condition is that the universe must, during a very early stage of its development when the baryon-number-violating processes are most effective, be in a state of non-equilibrium. This means that at some time in its early history, the universe must undergo a “phase transition”, a change of its basic state which happens so rapidly that the rate of collisions between the quantum particles in the primordial gas cannot keep up with it. If such a phase transition occurs, any matter-antimatter asymmetry that gets generated during the transition also gets to stay, because once the transition is over, the baryon-number-violating processes become less effective and baryon-number conservation is effectively restored. The ‘extra’ protons and neutrons, generated out of nothing, are now locked into the universe.

In summary, a matter-antimatter symmetry could be generated starting from a symmetric state provided that (1) baryon number was not conserved, (2) time-reversal-violating interactions exist, (3) the universe was once in a non-equilibrium state of extreme expansion. In the standard model neither condition #1 nor #3 is met, and hence the origin of visible matter remains a puzzle in this model. However GUTs, which go beyond the standard model, can violate baryon-number conservation. This led to a revival of interest in explaining the observed matter-antimatter symmetry. By 1978 many theoretical physicists, realizing that this old puzzle could now be explained in the context of GUTs, were hard at work calculating the symmetry to see if it would agree with observation.

A few years ago a T-shirt with the slogan "COSMOLOGY TAKES GUTs" enjoyed modest popularity among cosmologists. The slogan meant that GUTs could solve the problem of the origin of the matter-antimatter symmetry and thus explain the genesis of the visible universe. Yet another meaning of the slogan is that many GUTs imply that the neutrinos are not strictly massless and hence could make up the dark matter of the cosmos. GUTs might provide the answer to the origin not only of visible matter, but of the invisible matter as well.

This is a good first shot; it is as though a person trying to navigate a room while blindfolded and hopping on one foot has decided to stand on both feet. Until he takes off the blindfold [of Einsteinian relativity], however, he's got a few more walls to crash into.

In subsequent chapters, Pagels goes into what are charmingly called "SUSY GUTs", or super-symmetry GUTs. These are highly theoretical GUTs including complex assumptions concerning gravity, and a quote from this part of the book would probably leave you more dazed than the above one, unless you had first warmed up to it by the extended discussion in the text:

Kaluza demonstrated the unification of gravity and electromagnetism by means of his compact 5th dimension only by making several restrictive assumptions in solving Einstein's equations. In 1926 Oskar Klein significantly advanced this theory by showing that these restrictive assumptions were completely unnecessary. Furthermore Klein calculated the radius of the little circle in the 5th dimension in terms of the known quantities, the Planck distance scale, and the electronic charge, and found this radius to be about 10^{-30} cm - an extremely small radius ensuring that the 5th dimension is safely out of sight. But in spite of its small size, the freedom that fields have in moving around that tiny circle is always present at every point in ordinary space, and that freedom is all that is needed to guarantee the existence of the electromagnetic field.

After the 1930s the Kaluza-Klein idea fell out of favor, and for many years it lay dormant. But recently, as physicists searched out every possible avenue for the unification of gravity with other forces, it has again sprung to prominence. Today, in contrast to the 1920s, physicists are challenged to do more than unify gravity with just electromagnetism - they want to unify gravity with the weak and strong interactions as well. This requires even more dimensions, beyond the 5th.

Theoretical physicists have generalized the original 5-dimensional theory into an arbitrary number of higher dimensions. All the higher dimensions are compact; they are curled up into a tiny multi-dimensional space that exists at each point of ordinary space and hence is unobservable. But the freedom of moving around these compact, tiny spaces with symmetries more general than the simple symmetry of a circle corresponds exactly to the freedom of performing Yang-Mills gauge transformations. Remarkably the local gauge symmetries are precisely the symmetries of the compact higher-dimensional space. Because of this mathematical fact, all the gauge theories of Yang-Mills fields can be interpreted purely geometrically in terms of such higher-dimensional spaces.

Sadly, this exciting discussion is followed by a rather violent crash into the wall as our noble author endeavors to jam the stepsister-foot of the "big bang" into the glass slipper of symmetry theory. Actually he does this in a rather cute way. To simplify: If you can say that time "goes to zero" at the moment before the "big bang", then you've got an infinitely-contracting variable on that side of the symmetry equation, so you can shrink the other side down to an infinite contraction as well. This is kind of shaggy-dog physics, and

Pagels - to his credit - concedes as much. But on the whole I would say he deserves a round of applause for what is ultimately a courageous charge into frontiers that conventional minds fear to approach.