

## THE “EXTERIOR DECORATOR”

*Why do we see hydrogen and not something else?*

In order to see, *in space and time*, that which is *not* in space and time, and must therefore be changeless, infinite and undivided, there is a problem. The problem arises because the nature of the underlying existence, its changelessness, its infinitude and its undividedness, must show through in the apparition, just as, when a rope is mistaken for a snake, the length of the rope, through what is called the revealing power of the apparition, must show through in the snake for which it is mistaken.

Now if *the one* were to be seen as two, the oneness (the undividedness) of the underlying existence, showing through in the revealing power of the apparition, would bring the two together and close the twoness down. Similarly, if *the one* were to be seen as many, the oneness of the underlying existence would bring the many together and close the manyness down. But if *the one* is seen as *both two and many*, (the one against the other) then the many can prevent the collapse of the two, and the two can prevent the collapse of the many, because neither the two nor the many can be seen alone.

What we see in this Universe is an electrical duality against a gravitational plurality and the oneness shows through in the duality as the electrical attraction between the electron and the proton, and it shows through in the plurality as gravity. And the demise of the duality is prevented by the gravitational dissimilarity between the electron and the proton. That's Heisenberg's Uncertainty Principle. And the demise of the plurality is prevented by the spin duality. That's Pauli's Exclusion Principle.

Heisenberg's Uncertainty Principle does *not* prevent the demise of the electrical duality between the electron and the *positron* (an electron with a positive charge) because gravity is not involved there. Neither the electron nor the positron is wound up against gravity, but the proton is. And it is only the gravitational wind up of the proton that prevents the collapse of the duality in spite of the enormous electrical attraction between the proton and its electron. As Richard Feynman has pointed out, “the electron is purely electrical, the proton is not.”

According to the Vedantins, energy is the underlying existence showing in space and time through the revealing power of the apparition. It shows through in space as the gravitational and electrical energies – energies of position in space. And it shows through in time as inertia. But, as Swami Vivekananda pointed out to Nikola Tesla in 1896, these are all the same thing. That's why  $E = m$ , and why the gravitational field is so much weaker than the electrical field. The total

electrical energy must equal the total gravitational energy, the total nuclear energy and the total mass.

If seeing, in space and time, that which is *not* in space and time is a mistake, as the Vedantins have suggested, it's consoling to know that it will take the form of hydrogen falling together to galaxies and stars.

The *philosophy behind Vedanta* was invented by physicists. And the interesting thing, as I see it, is that the cosmological model that follows from their old physics is the only such model from which we could have predicted gravity, electricity and inertia. We could even have predicted Heisenberg's Uncertainty Principle to keep up the electrical duality, and Pauli's Exclusion Principle to keep up the gravitational plurality. And, so far as I can see, it's the only cosmological model that predicts that the Universe must have frustration built in so that neither gravity nor electricity can succeed, and so the Universe could not go on like this.

Way out there, in the Great Elsewhere, God is seen as hydrogen, monatomic hydrogen, falling together by gravity, coasting by inertia and shining by starlight because the undividedness, the changelessness and the infinitude of the underlying existence shows through. "If you find yourself at sea in a small, unlighted boat, alone in the darkness of a cloudless night, and if you look into the darkness of the space between the stars, then keep wide awake, and if your heart is filled with wonder and your mind is filled with peace, there is a chance that you will understand."

Most of the monatomic hydrogen remains dispersed through the vast expanse of the intergalactic spaces of the Great Elsewhere. Only a little bit of it has condensed into something we could see.

Mother is the hydrogen. Mother is the star.  
She falls it all together to make us what we are.

She makes the heavy elements and throws them all around,  
To make the rocky planets with soil on the ground.

She scatters the ingredients across the planet Earth,  
Assembling them with sunlight to give us all our birth.

She shines the sun on all these plants; the oxygen is waste.  
We munch the plants, and huff and puff, and run around in haste.

But we, poor dears, so mean of heart, assume we're in the know,  
And thinking we can manage, fail to see Who runs the show.

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February 25, 2002

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## THE FIRST CAUSE

*The constitution of the Universe may be put in first place among all natural things that can be known. - Galileo*

That, of course, is the problem of the physicist, to see if he can figure out the constitution of the Universe. And with the help of the Vedantins, and their old physics, I think we can. If we can throw in their old notion that the first cause of our physics, namely, *seeing in time and space* that which is *not* in time and space is apparitional (*Vivarta*) and that the subsequent causation of our physics is transformational (*Parinama*); and if we can throw in their old notion that there must be an existence underlying what we see in time and space, which must be Changeless, must be Infinite, must be Undivided, and *must show through*, we can sum it up fairly briefly.

Hydrogen is made out of energy. The Universe is made out of hydrogen. *And hydrogen is the Changeless, the Infinite, the Undivided showing through in time and space.* The Changeless shows through as inertia. The Infinite and the Undivided show through as the electrical and gravitational energies (the energies of position in space). The hydrogen is primordial. It arises by "apparitional causation" (*Vivarta*). Everything else arises *from* the hydrogen by "transformational causation" (*Parinama*). And the details are in the paper on "Synthesis of the Elements in Stars" by Burbidge, Burbidge, Fowler, and Hoyle.

But a problem still remains: Why does the apparition take the form of hydrogen and not something else?

Keeping in mind the position of those old Indian physicists, we may ask: If the Undivided were to be seen as *two*, what would prevent the undividedness from showing through and bringing the two together? And if the Undivided were to be seen as *many*, what would prevent the undividedness from showing through and bringing the many together? Those old physicists might then have replied that if the Undivided were to be seen as a duality *within* a plurality (such as we see in hydrogen), then the plurality could *prevent* the demise of the duality, and the duality could *prevent* the demise of the plurality. But isn't that exactly what we *do* see in the hydrogen?

In hydrogen we see an electrical duality (the electron and the proton in the hydrogen atom) against a gravitational plurality (the hydrogen atoms dispersed in space). *And they keep each other from collapsing.* Heisenberg's Uncertainty Principle does *not* prevent the demise of the electrical duality of the electron and the *positron* because they are not gravitationally dissimilar. But it *does* prevent the demise of the electrical duality of the electron and the *proton*, in spite of the enormous electrical attraction between them, because they *are* gravitationally dissimilar. The rest energy of the proton is related to its separation, *in the gravitational field*, from all the rest of the matter in the observable Universe. And,

through Pauli's Exclusion Principle, the *spin-duality* prevents the collapse of the neutron stars. It prevents the collapse of the plurality.

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## THE FOUCAULT PENDULUM

Often at a science center or in a planetarium building you may see some great pendulum swinging in the hall. What does it keep track of? Usually it is set up so that every few minutes the pendulum knocks over a peg, because the building, on the merry-go-round of the Earth's spin, slowly turns beneath it. Often the posted announcement will say that the pendulum keeps track of the Earth's spin. But alas, it pays *no* attention to the Earth's spin and gaily knocks over the pegs. So what *does* it pay attention to? What does it *care* about?

Sometimes the books say the pendulum keeps track of the "fixed stars", but you know and the stars know that there are no "fixed stars". And anyhow, how *could* it keep track of them?

Now suppose we change our mode of attack. Suppose we consider a pistol that is radio controlled, loaded and cocked, with a rifled barrel, and out between the stars. We then ask it to shoot. Now, because of the rifled barrel, the bullet comes out spinning. Does the pistol spin in the opposite direction? Yes, of course, with the exact same amount of spin but in the opposite direction. The bullet is lighter and spins faster, and the gun is heavier and spins slower. Because angular momentum is how heavy you are multiplied by how fast you are spinning, the lighter one (the bullet) spins faster and the heavier one (the gun) spins slower. But each has equal angular momentum in opposite directions.

The bullet is lighter and so moves away faster - as the gun is heavier and moves away slower. Because linear momentum is how heavy you are multiplied by how fast you are going the lighter one (the bullet) goes away faster and the heavier one (the gun) goes away slower. The moral to all this is, "Never shoot a pistol that weighs less than the bullet!"

Now for a time you might think that the gun keeps track of the momentum of the bullet. But we are going to let the bullet fall into a supernova star - which then scatters its momentum all over the galaxy. So now what does the gun keep track of? It *still* keeps track of the other half of its momentum which used to be packaged in the bullet but is now packaged in the entire Universe at large. So, the gun keeps track of the Universe at large.

Momentum is always half of something. So the Universe is "all dressed up with no place to go" because there is nothing with respect to which it could have some momentum. Linear momentum, angular momentum, and the electric charge are always half of something - and the other half, the opposite half, is packaged in the Universe at large. So, if you can watch the great Foucault pendulum swinging in the hall at the science center or planetarium and not get goose bumps, it may just be that you are asleep.

In 1965 the mathematician John Bell came up with an interesting theorem. His theorem said that if matter behaves as Quantum Mechanics says it should behave, then one of two things *must* fail. Either objectivity fails or local causation must fail. That is, either the Universe does not exist outside and independent of the observer or it must be possible to send messages faster than the speed of light.

In the 1970's and 1980's it was conclusively shown that where Bell's theorem is concerned matter does indeed behave as our quantum mechanical understanding says it should behave. So either the Universe is not "out there" as we thought it was or material influences can be transmitted at faster than the speed of light.

Since then many careful and interesting experiments have now been performed to show that in fact local causation fails – that material influences must be transmitted at faster than the speed of light.

Yet we already saw that material influences must be transmitted faster than the speed of light or the Foucault pendulum could not keep track of the momentum of the rest of the Universe. It cannot wait for the influence to come in from all the rest of the Universe at only the speed of light.

And anyway, what is actually meant by the speed of light?

The speed of light is simply the ratio of space to time. One light-year is equal to one year. In Einstein's Special Theory of Relativity space and time come into the geometry as a pair of opposites. And that puts the total separation, the space-time separation, the objective separation, between the emission of light and its absorption at zero. The emission and absorption events of the photons are adjacent in space-time. That puts the "real" separation between the emission events of the light which we think we see "outside" and the absorption events of that light in our eyes at zero. This seriously calls into question the "objectivity" of the world which we seem to see outside.

Perhaps the Foucault pendulum is telling us something.

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Well, maybe the Foucault pendulum is telling us something.



## THE GOD FACTOR: FOSSILS

On page 86 of the March (1990) issue of Astronomy magazine, under the title, "The God Factor", author Philip Stahl has suggested that the investigation of a "supernatural entity" might be beyond the domain of science. But that would be true if, and only if, the "supernatural entity" exerted no influence on what we see as physical phenomena. However, in the context of the young lady's question to him that would not be the case.

If such an entity *does* influence the existence or behavior of what we see as matter then surely its existence could be investigated through the "fossils" of that influence. After all, isn't that the way we investigate the dinosaurs, the trilobites, and the Big Bang? Isn't it through the helium abundance and the smoothness of the  $3^0$  Kelvin microwave background radiation and other such fossils that we investigate [the origins of the Universe in] the Big Bang? *It should be borne in mind that until the Big Bang model became established in our minds no one would have seen the helium abundance or the background radiation as "fossils".* It is only in light of the model that we see it.

The question now is: if we had a proper model of an entity "beyond matter, space, and time", would that model facilitate our recognition of its fossils?

Most modern cosmologists, whether proponents of the Big Bang or the Steady State, seem to assume that in the absence of matter, space, and time - there would be *nothing*. But is such a rash assumption warranted? The absence of time requires only the absence of change and the absence of space requires only the absence of dividedness and smallness, but not necessarily *nothing*.

This allows the possibility for a model of an entity beyond matter, space, and time which might be Changeless, Infinite, and Undivided. But if such an entity is changeless (beyond time) it cannot exert its influence through change, but only by "apparition" - by "showing through" - much as the length and diameter of a rope "shows through" in the snake for which it is mistaken. In light of this model the fossils which we seek in physical phenomena are actually measurable quantities. They are the qualities for which we have no other explanation - gravity, electricity, and inertia - which might be taken as evidence for the Changeless, the Infinite, and the Undivided "showing through" in space and time.

Fortunately in this case we don't have far to seek. The fossils are obvious enough, but only in light of this model would they be taken as "fossils". I see inertia as a "fossil" of the Changeless. The electrical charge on the miniscule particles I see as a "fossil" of the Infinite. And I see gravity as a "fossil" of the Undivided. The existence of gravity, electricity, and inertia still stand in our physics completely unexplained. In the absence of a suitable model of an entity

beyond matter, space, and time, and in the absence of an understanding of the nature of its possible influence on physical phenomena, we simply had to take them for granted up until now.

*It will be of no use to suggest that this is "metaphysics" and need not be taken seriously. Anything which influences the existence or behavior of physical phenomena is within the domain of physics.*

John L. Dobson  
February 18<sup>th</sup>, 1990

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Most modern cosmologists, whether proponents of the Big Bang or the Steady State, seem to assume that in the absence of matter, space and time, there would be nothing. But is such a rash assumption warranted? The absence of time requires only the absence of change, and the absence of space requires only the absence of dividedness and smallness, not necessarily nothing. And that allows the possibility for a model of an entity beyond matter, space and time which might be changeless, infinite and undivided. But if such an entity is changeless (beyond time), it cannot exert its influence through change, but only by apparition, "showing through", much as the length and diameter of a rope shows through in the snake for which it is mistaken. In the light of this model then, the fossils which we seek in the physical phenomena are measurable quantities for which we have no other explanation, and which might be taken as evidence for the changeless, the infinite, the undivided showing through in space and time.

Fortunately, in this case, we don't have far to seek. The fossils are obvious enough, but only in the light of this model would they be taken as fossils. I see inertia as a fossil of the changeless. The electrical charge on the minuscule particles I see as a fossil of the infinite. And I see gravity as a fossil of the undivided. The existence of gravity, electricity and inertia stand in our physics completely unexplained. In the absence of a suitable model of an entity beyond matter, space and time, and in the absence of an understanding of the nature of its possible influence on physical phenomena, we simply had to take them for granted.

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## **THE GREAT MAGNETIC EGGBEATER**

If the cloud from which our galaxy condensed had not passed another such cloud before the early stars were born, then it would not have been spinning. This is because the cloud would not have picked up angular momentum as it passed, and we would not be here. It is this angular momentum, from passing another cloud, that shows up as the spin of the early stars (the stars of the central bulge and the globular clusters) because stars that condense from a spinning cloud will themselves be spinning. Now, when stars spin, their magnetic fields must spin with them. That is because the stars, being made of electrical particles (electrons, protons, alpha particles etc.), are electrical conductors themselves and they drag their magnetic fields along with them when they spin. Now these spinning magnetic fields interact with the surrounding material which has been ionized to electrical particles by the ultraviolet radiation of the stars. It is this ionized material surrounding the stars that allows the spins to slow down. This is because the angular momentum of the spinning stars is simply transferred by these magnetic fields to the surrounding ionized material. This is blown away by the stellar winds to what I call the "hovering layer" of the galaxy, or the "halo".

By this process most of the angular momentum of the cloud winds up in the hovering layer which, because of its angular momentum, flattens to a disc. If you look at the beautiful edge-on galaxy NGC 4565, you can see that although the central bulge is not flat, the disc is as flat as a plate.

Now, since most of the angular momentum of virtually all the early stars of our galaxy would thus have been transferred to the hovering layer which has flattened into the disc in which our Sun was born, we now think that our Sun used to spin some two hundred times faster than it spins now. And it is the spinning magnetic field of the Sun's youth that I call "the great magnetic eggbeater."

It is the Sun's magnetic eggbeater that must have sorted the material of the Solar System so that the planets near the Sun could be made of iron and rock while the planets farther out could be made of lighter materials. It takes about the same amount of energy to knock an electron off a proton as to knock it off an iron nucleus, so the magnetic push on the particles would be about the same. It is because the push on the lighter particles is as strong as on the heavier ones that the lighter ones get flung farther out.

But Jupiter and Saturn are stars. They're not planets at all. They must have come down in the cloud with the Sun and retain much, or most, of their original spin. (Jupiter, at present, has some eighty percent of the angular momentum of the Solar System while the Sun has only about two percent.) But Jupiter and Saturn can't shine in the ultraviolet and ionize the surrounding material, so their magnetic fields can't transfer their angular momentum away.

It is interesting to note that if our galaxy had not passed another galaxy before the early stars were born we would not have a dusty disc. And without that it may be impossible to form solar systems at all.

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July 7, 2002

## TWISTERS IN TEXAS

It appears to me now that twisters in Texas are the observational evidence that galaxies are born in bunches.

In those early clouds of primordial hydrogen, condensing to form galaxies, it is to be expected that down in the center of such a cloud, where the density is greatest, several enormous galaxies, like M86 and M87, would curdle out first. Smaller galaxies, still falling in, on passing one of these larger galaxies would be spun up by gravitational interactions. (This would happen even to clouds not yet condensed to galaxies.)

Now stars condensing from a spinning cloud will themselves be spinning. And their angular momentum will be transferred by their spinning magnetic fields to what we may call the "hovering layer" (the halo of the galaxy). The angular momentum is transferred to the hovering layer because young stars shine in the ultraviolet and knock the electrons off the atoms near by. Then, since the stars are electrical conductors, their magnetic fields must spin with them. And it is these spinning magnetic fields (what I call the "great magnetic eggbeaters") that transfer the angular momentum of those spinning stars to the surrounding atoms which carry it away on stellar winds to the hovering layer. In this way a large proportion of the angular momentum of the younger galaxy will be transferred to its hovering layer. It is this original angular momentum, picked up by passing a larger galaxy that flattens the hovering layer to a disc and makes solar systems possible.

It appears to me now that only in the disc of a spinning galaxy could solar systems be expected to form at all. I see no other way to accomplish this. It takes a great deal of angular momentum to orbit spinning planets around a spinning star. And I see no way to get the required angular momentum unless galaxies are born in bunches.

Now what about twisters? Since the molecular weight of water is only eighteen while the molecular weights of nitrogen and oxygen are twenty eight and thirty two, and since we have the same number of molecules in a given volume of air at the same temperature and pressure, wet air is a great deal lighter than dry air. (That's why the clouds are flat on the bottom. The drier air stays down below.) So the wet air goes up, cools off, and then drips. You must have noticed. And when water vapor precipitates out as a cloud or rain its heat of vaporization is released into the cloud.

It takes 540 calories to evaporate a gram of water. That's almost three times as much heat as is required to melt a gram of ice and bring that water to a boil. And when water vapor is precipitated out, to cloud or rain, all that heat is released into the cloud. So the cloud goes up, cools off and drips some more.

That starts it all over again, and it continues like that till it runs out of water vapor. And it's the air that comes in from below to replace the rising cloud that blows your house away.

Some time back, over the Gulf of Mexico, a large quantity of warm, wet air went up and cooled off while traveling north toward North Carolina. It dropped some ten inches of rain over North Carolina, and you have to think how much heat is required to evaporate ten inches of rain over North Carolina. That's how much heat went into that cloud. That's why it went up and was replaced from below. *The hurricane doesn't bring the rain. The rain brings the hurricane.* And it all starts when the warm, wet air goes up.

But why do we have twisters? Why does the air come in spinning? That's because our Galaxy itself was spinning, long ago, so that its hovering layer could be flattened into the disc of the Milky Way in which the Sun and its planets were born. *That's why the Earth is spinning.* And the same Coriolis Effect that throws you down sideways when you walk across the merry-go-round throws the wind sideways when it comes in from below, across a spinning Earth, to blow your house away. And those whirlwinds spin in the *same* direction south of the equator, only we see them from the other side.

If galaxies weren't born in bunches, I don't think we'd have twisters at all - in Texas or anywhere else. And I don't think we'd even have Texas.

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October 15, 2002

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It takes five hundred and forty calories to evaporate a gram of water. That's almost three times as much heat as is required to melt a gram of ice and bring that water to a boil. And when water vapor is precipitated out, to



cloud or rain, all that heat is released into the cloud. So the cloud goes up, cools off and drips some more. That starts it all over again, and it continues like that till it runs out of water vapor. And it's the air that comes in from below to replace the rising cloud that blows your house away.

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## TYCHO

Newton pointed out that we stand on the shoulders of giants. Tycho was one of his giants, and Newton is one of mine. Let me explain!

In Tycho's day there was much discussion about what the planets are. Tycho said, "Let's find out *where* they are and then we can talk about *what* we are." My hero!

That remark is almost the beginning of modern science. Tycho had spent many years investigating where the planets are and how they move. That was the information that fell into Kepler's hands when Tycho died. Who else do you know whose death gave rise to such a flowering of knowledge? Let me explain!

Kepler and Galileo both knew each other and wrote to each other, but neither one of them knew what the other one knew. So we had to wait for Newton. Galileo studied gravity and inertia but he didn't know that the planets went in orbits that were ellipses. Kepler knew from Tycho's painstaking measurements that the planets went around the Sun in elliptical orbits but he didn't have a handle on gravity and inertia. Newton had to put it all together. *"The Sun is pulling on the planets as the Earth is pulling on the Moon."*

Probably we shall never know how much we owe these giants. I once asked Richard Feynman (one of my giants), "Can we understand the rest mass of the proton as just the energy represented by its separation, in the gravitational field, from all the rest of the matter in the observable Universe?" He agreed. But Feynman didn't know *why* gravity pulls, and he didn't know *why* bicycles coast. He knew *how* but not *why*. And Einstein (another one of my giants) didn't know *why* matter should appear "as discrete electrical particles." Why, if they are tiny, must they be electrical? Why, if they are dispersed, must they fall together? And why, if they are moving, do they coast?

Now some of my giants lived not a few hundred years back but a few thousand years back. They built their physics into their language and left it there for all to see, and that is where Einstein got  $E=mc^2$ , and I take my hat off to them.

They said, "If the world is 'the changing' (Jagat), there must be something underneath that's not in time and space – not changing, not finite, not divided, and not two (Advaita)." Their question then was, "How, then, do we see change? It must be by a mistake. The world which we see must be a mistake-world." Not a dream-world, but a mistake-world. So, they studied mistakes. My heroes.

You can't mistake your friend for a ghost without seeing your friend. And if your friend is tall and thin then the ghost you see would be tall and thin. If your friend is roly-poly then you'll see a roly-poly ghost. So, the changeless shows

through in our mistake-world as inertia; the infinite shows through in the smallness as the electrical repulsion of like charges; and the undivided shows through as gravity and the attraction between opposites. But wait! There are details.

The torch went from Tycho to Kepler. From Kepler and Galileo to Newton. From Newton to Einstein and Feynman, Heisenberg, Pauli and so many others. And now we see the details.

Wouldn't it be nice if we could explain to Tycho where his views have led?

The Universe is not made out of forces, momentum, spin, or electrical charge. Their sum totals (in the observable Universe) all go to zero. The Universe is made out of energy and this energy is the "wind-up" against the mistake. Gravity is the "wind-up" against dispersion. The electrical repulsion for like charges is the "wind-up" against smallness. And inertia is the "wind-up" against change.

Stars convert gravitational energy into radiation and this drives the cosmological expansion – because the radiation loses its energy to red-shifting in the expansion. The red-shifting drives the cosmic microwave background radiation because radiation gets thermalized to  $3^0\text{K}$  by going through the field of low mass particles near the observational border. Through Heisenberg's Uncertainty Principle the red-shifting also drives the recycling of the hydrogen and the negative entropy from the border, because as the uncertainty in the momentum goes down, the uncertainty in where the particles are goes up.

In addition, if the world is a mistake-world, it will be smitten with uncertainty and frustration. Heisenberg's Uncertainty Principle frustrates the collapse of the electrical duality. Pauli's Exclusion Principle frustrates the collapse of the gravitational dispersion. The recycling from the border frustrates the collapse of negative entropy. And the Universe sails on.