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SUBQUANTUM KINETICS: EXPLORING THE CRACK IN THE FIRST LAW

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ABSTRACT

Astrophysical observations of the cosmological redshift and stellar mass-luminosity relation suggest that small violations in energy conservation take place on a regular basis. This evidence supports the "open system" physics of subquantum kinetics which suggests that photons progressively lose energy in intergalactic space and progressively gain energy in the vicinity of galaxies. NonDoppler photon blueshifting, occurring at a rate 10^8 fold below rates measurable in the laboratory, is able to account for all the energy output from red dwarf stars and from Jupiter, Saturn, and Uranus. It also accounts for about two-thirds of the Sun's output. Consequently geothermal, solar, and fossil fuel energy sources, to a large extent, could be sources of "free energy" generated in violation of the First Law. These considerations suggest the necessity of taking a more lenient interpretation of the First Law and acknowledging the possibility that free energy devices could operate at efficiencies exceeding 100%. Several ways of generating free energy are evaluated in the context of subquantum kinetics genic energy (photon blueshifting), zero-point energy fluctuations, Ampere law forces, and electrogravitic gravity field manipulation.

INTRODUCTION

Twentieth century physics presumes that energy, as a rule, is strictly conserved. Thermodynamicists have enshrined this principle as their First Law of Thermodynamics which states: Energy can be neither created nor destroyed, only converted from one form into another. The First Law has long been used by patent office examiners to judge the reasonableness of new ideas proposed in patent applications. Any application that proposes a device capable of generating energy without consuming an equivalent amount of fuel or converting an equivalent amount of energy from some known source is quickly labeled as a "perpetual motion machine" hoax and placed in the rejection box.

Nevertheless, an increasing number of innovators claim to have built and successfully operated such "free energy"* machines or "over-unity" devices, as they are sometimes called. Some working models have been shown to operate at fantastic efficiencies, with output-to-input power ratios exceeding a thousand percent. Even U.S. federal agencies have begun closet programs actively researching such nonconventional power systems, although their work has not been publicized.

If the First Law is incorrect in maintaining that energy is always perfectly conserved, then our government, educational and business institutions are performing a great disservice to the public by insisting that funds for research into new energy and transportation systems must be allocated only to projects that obey this dictum. Such a practice, then, would unnecessarily restrict research to the well-tried conventional paths of the past at a time when, more than ever, we must strive to develop ways of tapping unlimited supplies of ecologically safe, "cool" energy that does not increase the Earth's burden of greenhouse gases.

Is there evidence that nature does not always obey the First Law? If so, is there a physics which can accomodate such "violations" of this principle and which can provide a theoretical basis for understanding the operation of some of these free energy devices? Let us consider the first question.

DOES NATURE VIOLATE THE FIRST LAW?

The First Law, in its strict form of proclaiming perfect energy conservation, is actually an untested hypothesis. From an observational point of view, one can reasonably claim only that energy

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* Here the word "free" is used in a different sense than it is conventionally used in thermodynamics.

is conserved to within certain experimentally verifiable limits. Even Maxwell allowed for the possibility that radiant energy might exhibit nonconservative behavior. His original electromagnetic wave equation contained the energy damping term, $\sigma_o \mu_o \bullet \partial \varphi / \partial t$, where σ_o represented the electric conductivity of background space [1].

Upper limits on the validity of the First Law may be determined in the laboratory by checking the energy constancy of a photon beam by means of laser interferometery. Given that the frequency of a beam emitted from an iodine-stabilized He-Ne laser is stable to about one part in 3×10^{13} over a 10^5 second sample integration time, a null result from interferometric measurements made on such a beam travelling a distance of 100 meters would establish only that its photon energy was constant to one part in 10^7 per second.

Such an assurance level, while sufficient for adhering to the energy conservation assumption when considering physical phenomena observed in a laboratory, is insufficient where astronomical phenomena are concerned. The cosmological redshift offers one example. In the past, this effect has been widely interpreted as being evidence of galactic recession. However several cosmological studies [2–5] suggest, to the contrary, that extragalactic redshifts are more likely due to a "tired-light effect" in which photons progressively lose energy in the course of their long journey through a nonexpanding universe [4,6–11]. That is, if photons from a distant galaxy were to lose just 3.4×10^{-18} of their total energy each second, a 10.7% energy loss for every billion light years travelled, their wavelength would lengthen by an amount sufficient to explain the cosmological redshift effect. Thermodynamicists would be entirely unaware of the presence of this energy loss rate since it is some 10 orders of magnitude smaller than loss rates potentially observable in the laboratory.

Conservation law violations of comparable magnitude but of opposite sign could provide a substantial portion of the energy radiated from stars. Consider the Sun for example. Given the low flux of neutrinos observed to come from the Sun, which has averaged about 25±12 percent of the expected amount in ^{37}Cl detectors [12] and 46±3 of the expected amount in the Kamiokande-II neutrino detector [13], we may conclude that fusion energy supplies only about one third of the Sun's total energy output. Thermodynamicists would have no grounds to deny that the remaining two-thirds is supplied by an ongoing photon energy amplification process, since the required rate of photon nonDoppler blueshifting is eight orders of magnitude smaller than the smallest energy change detectable with laboratory instrumentation. Taking the Sun's total thermal energy content to be $H_\odot = C \bullet M_\odot \bullet T = 4.5 \times 10^{48}$ ergs, (given an average heat capacity $C = 2.09 \times 10^8$ ergs/g/K, a solar mass $M_\odot = 2 \times 10^{33}$ g, and average internal temperature $T = 9.5 \times 10^8$ K), the Sun's entire luminosity of 3.9×10^{33} ergs sec^{-1} could be explained if solar photons were increasing their individual energies at a rate of just 10^{-15} sec^{-1}.

In considering possible First Law violations in astrophysical processes, we must not overlook one of the most significant of phenomena—the origin of the universe. Conventional physics fails to provide a reasonable explanation, for it does not permit new energy (or matter) to be created out of the presumed vacuum of space. This is especially embarrassing because physicists embrace the big bang theory as their preferred cosmology. So not only must this matter/energy be created, it must be created all at once in what appears to be the biggest First Law violation of all time. But, there is no antecedent state from which the primordial quantum could have emerged, space/time and existence itself all being supposed to have emerged for the first time with the occurrence of this primordial event. Armchair acrobatics aimed at explaining away the Creation by attributing it to a fluke of nature seem to be desperate attempts made by physicsists and cosmologists to free themselves from their tight corner.

This egg-without-a-chicken problem would be avoided by a physics that presumes the preexistence of a subquantum medium, from which matter and energy later emerge. The ideal physics would prescribe a creation process that would unfold over an extended period of time, so that it would not involve a substantial deviation from the dictates of the First Law. Let us now investigate a physics methodology that proceeds along these lines.

SUBQUANTUM KINETICS

For a long time now, there has been a split between physics and the life sciences. Physics, which historically developed within a mechanistic framework, chooses to view its basic systems—

particles and fields—as closed systems requiring no ongoing sustenance for their continued existence. Biological systems, on the other hand, are thermodynamically open. They require a continuous flux of their constituent subsystem components in order to maintain their ordered states. The same is true of a wide variety of other living systems, such as social, economic, and psychological systems. All are describable by the same general laws and mathematics.

Unlike quantum structures, living systems are easily accessible to direct investigation. So could it be that, because they necessarily operate in an obscure realm, physicists have failed to realize the true nature of microphysical systems and are wrong in believing that they are fundamentally different from other natural systems?

The subquantum kinetics physics methodology [8–10,14,15] was developed with the conviction that nature operates in fundamentally the same way at all levels of its system hierarchy. It conceives quantum structures to be concentration patterns that emerge from a primordial reaction-diffusion medium in much the same way that concentration patterns emerge in the Brusselator [16] or in the Belousov-Zhabotinskii chemical reaction [17], namely as epiphenomena of open reaction-diffusion processes. It is baseed on the general theory of open systems, whose development in recent years has been aided by developments in the fields of general system theory, nonequilibrium thermodynamics, nonlinear chemical kinetics, and chaos theory. Thus subquantum kinetics brings us a step closer to realizing the vision of a unified science.

Subquantum kinetics adopts a theoretical approach very different from conventional physics. Physicists have traditionally begun with sets of observational data describing various kinds of physical phenomena and have attempted to construct explanatory theories for each. Because these various theories were usually developed in isolation from one another, it is not surprising to find that they sometimes turn out to be mutually contradictory, as is the case for quantum field theory and general relativity. This leaves physicists struggling to sew together their theoretical patchwork quilt in hopes of achieving the long sought goal of a unified field theory. Subquantum kinetics, on the other hand, takes a modelling approach. It begins with theory and ends with observation, rather than vice versa. It postulates an appropriate set of inherently unobservable subquantum reaction-diffusion processes and then checks to see if the spatiotemporal patterns, which these processes produce, reproduce observed microphysical phenomena. Thus subquantum kinetics attempts to extend the well-tested concepts of the general theory of open systems to the realm of physics.

Subquantum kinetics has several advantages over standard physics. It provides a commonsense model of subatomic matter that avoids the pitfalls of the infinite field-energy absurdity, wave-packet spreading problem, cosmological constant conundrum, wave-particle dualism, and field-source dualism, all of which plague conventional theory. Moreover it is a unified field theory. The energy fields that make up the core of a subatomic particle, as well as those composing the electric (magnetic), gravitational, and nuclear binding fields that extend about the particle, all emerge in a unitary fashion from a single set of nonlinear equations describing the ether reaction processes. In addition, subquantum kinetics provides a fertile theoretical grounding for interpreting nonconventional technologies such as Tesla's "sound wave" model of radiant energy [18] and the electrogravitic (antigravity) effects first reported by Townsend Brown [19].

Conventional physics restricts itself to the positivist doctrine of recognizing only the measurable as having a real existence. Subquantum kinetics, on the other hand, also recognizes the existence of an unobservable subquantum realm. In fact, it proposes that processes occurring at this unobservable level hold the key to explaining the existence of our observable world. As in mystical traditions, the observable world emerges as an epiphenonmenon of this unseen realm. Thus not only does subquantum kinetics eliminate the gap between the physical and life sciences, it also heals the age old division between modern science and religion.

Subquantum kinetics avoids many of the problems modern cosmology has created for itself. It predicts a cosmologically static universe, rather than an expanding one. Matter arises in "fertile" pockets scattered throughout the universe through a gradual process of continuous creation, rather than all at once in a single Big Bang. This static universe cosmology makes a better fit to cosmological test data than does the big bang theory [4].

Probably most significant from the standpoint of

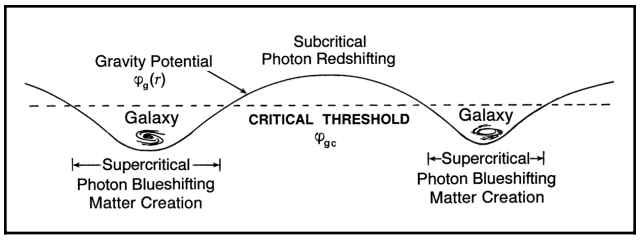

Figure 1. Photons become blueshifted in regions near galaxies and redshifted in intergalactic space.

energy conversion engineering is the theory's prediction that electromagnetic energy is not strictly conserved. Electromagnetic energy potentials are able to gradually decrease over time or increase over time, depending upon whether the subquantum reactions are subcritical or supercritical, the criticality of the reactions being determined by the value of the gravitational potential, φ_g. Thus subquantum kinetics predicts that EM waves will gradually lose energy (become redshifted) in intergalactic space where φ_g is relatively high and will gradually gain energy (become blueshifted) in the vicinity of galaxies, where φ_g becomes most negative; see Figure 1. Perfect conservation of wave energy occurs only at the interface of these regions where the subquantum reactions operate at their critical threshold.

The energy spontaneously generated by the blueshifting of photons is termed genic energy. Genic energy may be considered to be a kind of "free" energy since it arises spontaneously and not from another prior form of physical energy. There is no mystery as to where genic energy comes from. its source may be traced to the subtle nonphysical motive forces that drive the underlying subquantum reactions.

But, accounting for the ultimate source of genic energy is a small matter. The real question physicists should be asking, in the context of subquantum kinetics, is what energy source sustains the entire physical universe. Subatomic particles and energy waves are ordered forms, dissipative structures that have formed out of a subquantum continuum filling all space. If the subquantum reactions were to cease, the universe would turn into a closed system; and as we know from the Second Law of Thermodynamics (whose validity we do not question), in a closed system ordered states inevitably decay. Quantum structures would begin to homogenize and would eventually vanish from the observable world. So in this dissipative, open system model of the physical universe, the status quo is maintained by the throughput of a tremendous subquantum flux.

The rate of genic energy production is estimated at [10]:

$$dE/dt = \alpha \varphi_g E , \qquad (1)$$

where E is the photon's initial energy, φ_g is the value of the ambient gravity potential, and $\alpha = 5.23 \times 10^{-32}$ sec cm^{-2}.* Photons would gradually blueshift in an earth-based laboratory, but the process would occur so slowly as to lie well below the threshold of detection. Nevertheless it would make a significant contribution to the energetics of planets and stars. The heat stored in a celestial body would spontaneously evolve "genic" energy at the rate:

$$L_g = dE/dt = \alpha \varphi_g C M T, \qquad (2)$$

where C, M, and T are the specific heat, mass, and temperature.

Relation (2) leads to a stellar mass-luminosity relation of the form $L_g \propto M^x$, where $x \sim 2.7 \pm 0.9$ [20]. This is quite reasonable, considering that the mass-luminosity relation for lower main sequence red dwarf stars $M < 0.45\ M_\odot$ has a slope of $x = 2.76 \pm 0.15$; see Figure 2 [20]. So all red dwarfs could be powered entirely by genic energy.

Genic energy would also explain why the mass-luminosity coordinates for the jovian planets, Jupiter, Saturn, Uranus, and Neptune fall close to this line. Formerly the excess heat radiated from these planets was thought to come from a primordial heat reservoir in their interiors. However, the conformance of both planets and low mass stars to a common relation rules out both primordial heat and nuclear energy as a possible cause, nuclear fusion being unable to occur in jovian planets and primordial heat being insufficient to sustain the energy output of low mass stars. Genic energy, on the other hand, is able to adequately explain the output from objects at both ends of this mass range.

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* The value suggested for α is sufficiently small that photons travelling through the Galaxy would accrue blueshifts of less than 3×10^{-6} (1 km/sec) over a distance of 10^5 light years. Hence the effect would be undetectable in the spectra of stars within our Galaxy.

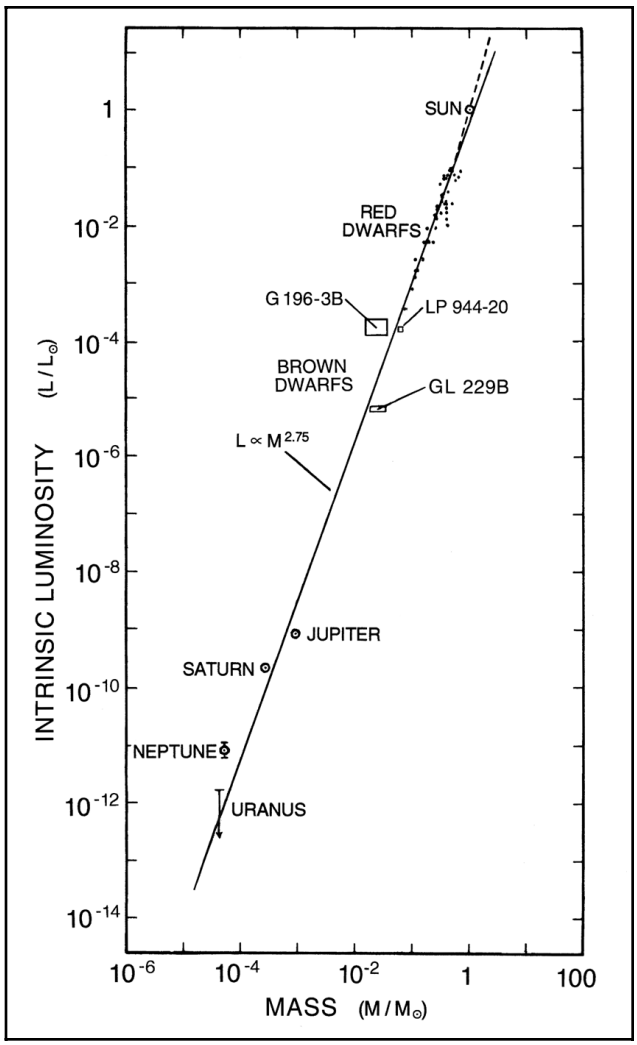

Figure 2. The lower main sequence stellar mass-luminosity relation compared to the mass-luminosity coordinates of several planets.
$M_\odot$: one solar mass, $L_\odot$: one solar luminosity.

In addition, if we project this "planetary-stellar mass-luminosity relation" upward to one solar mass, we find that genic energy accounts for about 60% of the Sun's output. This explains why fusion energy makes up only about one third of the Sun's total energy flux, as judged from the Sun's subnormal neutrino output. For stars more massive than the Sun, fusion would make a progressively greater contribution. However, since the majority of stars in the universe are less massive than the Sun, subquantum kinetics predicts that, for the most part, the universe is powered by genic energy.

Genic energy also effectively accounts for X-ray emitting white dwarfs, X-ray stars, stellar pulsation, novae, supernovae, and galactic core explosions [10]. Conventional astrophysical theory runs into problems in explaining many of these. For example, it fails to explain why β Cephei stars pulsate, why supernovae occur in hot blue giant stars, what energy source powers supernovae and galactic core explosions (some of the more powerful active galaxies being unexplained even by blackhole models).

Genic energy, by itself, cannot account for the large power outputs observed from free energy devices. But, if minor violations of the First Law are the rule, rather than the exception in nature, perhaps physics should reevaluate its assumption that such violations are an impossibility. The uncertain status of the First Law gives us reassurance that theoretically it may be possible to build devices that produce energy conservation law violations substantially larger than the fractional amounts we have been discussing.

VARIETIES OF FREE ENERGY

It appears that free energy can arise in many ways. We will discuss some of these ways, examine them in the context of subquantum kinetics, and assess their applicability to commercial power generation.

Genic energy. As was said earlier, subquantum kinetics proposes that nonDoppler photon blueshifting occurs naturally in and near all galaxies. It predicts that approximately three–fourths of the Earth's geothermal heat flux arises from genic energy, the remaining quarter being attributed to crustal radioactivity. If so, this suggests that geothermal power plants may be tapping free energy, at least in part. Also since at least two thirds of the Sun's energy may be of genic origin, power plants running on solar energy or fossil fuels (stored solar energy) would be running mostly on free energy. However, laboratory-sized heat reservoirs evolve genic energy at far too small a rate to be applicable to commercial power generation.

Zero-point energy fluctuations. The zero-point energy concept developed as an outgrowth of quantum field theory which proposes that material particles exert forces on each other by emitting and absorbing "virtual" subatomic particles. However, the virtual particle concept suffers from the problem that it requires subatomic particles to have infinite masses [21]. Nevertheless, this concept has been taken in another direction with the suggestion that throughout space particle-

antiparticle pairs continuously materialize from the vacuum and soon after disappear by mutual annihilation. This sea of potential energy fluctuations is theorized to persist even at absolute zero. Some suggest that by inducing these fluctuations to arise in a coherent manner, it might be possible to extract energy from this "Dirac sea" [22].

Subquantum kinetics takes a different view of the zero-point energy concept. It proposes that random concentration fluctuations continuously arise in its various ether substrates as a result of the statistical nature of the subquantum ether reaction and diffusion processes. These appear as random pulses of gravitational or electric potential energy. However, these fluctuations are millions of times smaller than virtual particle fluctuations, each pulse comprising a very small fraction of a quantum of action. Moreover these fluctuations do not arise as plus/minus pairs; being concentration deviations, they are always positive valued. Despite their small size, these fluctuations play a key role in the subquantum kinetics matter creation process. Under supercritical conditions, a sufficiently large fluctuation can grow in size and eventually turn into a subatomic particle. However, as in photon blueshifting, this growth process occurs very slowly. So, according to subquantum kinetics, it is unlikely that this phenomenon could provide a commercially exploitable source of energy.

Ampere law forces. Several experiments have shown that magnetic forces are best described by the Ampere law, rather than the Biot-Savart law [23–28]. The Biot-Savart law errs in that it fails to predict forces between parts of a circuit having different charge mobilities, such as longitudinal forces exerted in the vicinity of a spark gap. In particular, as Pappas has shown [29], the Ampere law predicts that like charges moving in the same direction will exert attractive magnetic forces on one another. The net interplay of Coulomb repulsion and Ampere law attraction turns out to be noncon–servative. Above a certain speed Ampere attraction is strong enough to overcome Coulomb repulsion, thereby propelling the particles into a run away collision which, upon impact, allows Coulomb repulsion to dominate once again. He suggests that such a mechanism may be responsible for producing both fusion and excess free energy in cold fusion experiments.

Ampere electrodynamics may also account for the excess energy produced by free energy machines such as the N machine and other magnetic devices. Although these devices might operate in a variety of different ways, in general, their ability to produce free energy suggests that fields do not always behave in an energy conserving fashion. The open system field theory presented in subquantum kinetics has the advantage that it is not unnecessarily restricted by the First Law.

Gravity field manipulation. In the mid 1920's Townsend Brown discovered that by applying high-voltage charge to a capacitor, he could generate a gravitational field which induced the capacitor to move toward its positive pole [19,30]. His research led him to produce an electrogravitic device capable of self-levitation [31]. This soon led to a major effort by the defense department and major aircraft corporations to develop antigravity aircraft for military use [32–35]. In one of his other ex–periments, Brown arranged capacitors on the periphery of a rotor to form an electrogravitic motor capable of running at high speeds even in a vacuum. This demonstrated that it is possible to generate an artificial gravitational vortex and to extract free energy from that vortex via a central rotor turning in perpetual free fall.

Coupling between electrostatic and gravitational fields is predicted neither by general relativity, nor by conven–tional field theory. However, it is predicted by subquan–tum kinetics. According to subquantum kinetics, protons generate gravitational potential sinks and electrons generate slightly lesser gravitational potential sources. In neutral matter these two opposing effects add up to produce a net gravitational sink—an attractive gravi–tational field. However, when the charges are sepa–rated, as in a charged capacitor, they establish a gravity potential gradient that proceeds from the negatively charged side down to the positively charged side.

CONCLUDING REMARKS

We are entering an era in which physics theories of the past are increasingly fallling behind in their ability to explain adequately the emerging energy technologies. There is now a pressing need to investigate new theoretical approaches in which spontaneous energy creation is the rule, rather than the exception. Subquantum kinetics may be one such approach worthy of consideration.

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