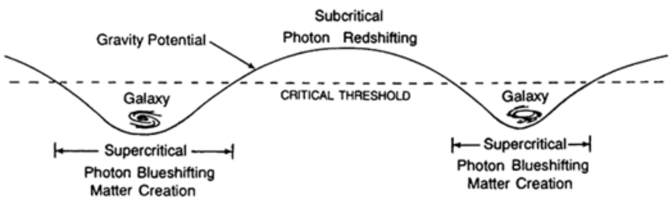


Figure 1. Subquantum kinetics predicts that photons progressively blueshift in the vicinity of galaxies and progressively redshift in intergalactic space.

as when a photon leaves (or approaches) the surface of a star. The nonconservative effect described here occurs even when there is no change in gravitational potential.

## 3. GENIC ENERGY

The present paper evaluates the subquantum kinetics photon blueshifting prediction, namely, the energy relation

$$dE/dt = \mu E, \tag{6}$$

where $\mu = \alpha(\phi_{gc} - \phi_g)$, and $\phi_g$ is the ambient gravitational potential. The value suggested for $\alpha$ is sufficiently small that photons traveling through the galaxy accrue blueshifts of less than three parts per million over a distance of 30 kpc, equivalent to a 1 km/s Doppler shift. Hence the effect would be undetectable in the spectra of stars within our galaxy. However, it would make quite a substantial contribution to the internal energetics of planets and stars. The heat stored in a celestial body would spontaneously evolve blueshifted "genic" energy at the rate

$$L_g = dE/dt = \mu H = \alpha(\phi_{gc} - \phi_g)\bar{C}M\bar{T}. \tag{7}$$

This created genic energy comes from the underlying subquantum reactions. Whereas the nineteenth-century mechanical ether was an inert and inactive substance, the subquantum kinetics ether reactions operate in a continuous nonequilibrium state continuously building up the $G$, $X$, and $Y$ concentrations that compose the physical universe. While the unobservable subquantum reactions may be assumed to behave in a conservative manner, the observable field amplitudes they produce can behave nonconservatively, allowing entropy to stay constant or even decrease over time. Such are the characteristics of an open system. Clearly, a physics that allows the continuous creation of negative entropy is advantageous from a cosmological standpoint, since it can explain the origin of the universe.[5]

The genic energy production rate of a celestial body of radius $R$ and mass $M$ may be more precisely expressed as

$$L_g(M) = \int_0^R dLdr$$
$$= 4\pi\alpha \int_0^R \phi_g(r, M)C(r, M)T(r, M)\rho(r, M)r^2 dr, \tag{8}$$

where $r$ is the radius of a shell of thickness $dr$, and $\rho(r, M)$ is the mass density within the shell. The $T(r, M)$ and $\rho(r, M)$ values found in the conventional equation-of-state models formulated for brown dwarfs and hydrogen-burning stars are inappropriate for the case where genic energy makes a substantial contribution. For example, compared with a conventional brown dwarf (that is adiabatically cooling and devoid of a supplemental internal heat source), a genic-energy-producing dwarf would present a lower core density and higher core temperature. This is because a disproportionately greater amount of heat energy would be produced at the star's center due to the temperature and density dependencies of the genic energy production process. The opposite situation prevails when comparing a star powered entirely by thermal fusion to a star powered by a combination of genic and fusion energy. Hence a genic energy-producing star would have a higher central density and lower central temperature. Unlike fusion, which is restricted to a star's core, genic energy would arise in substantial amounts throughout the star's volume.

Using currently available model parameters for the temperatures and densities in the cores of brown dwarfs and main sequence stars, it should be possible to place rough bounds on the size of the exponent $x$ for the genic energy mass-luminosity relation $L_g \propto M^x$. At the one extreme we take the brown dwarf evolutionary track model of Nelson, Rapparport, and Joss,[9] which models electron degenerate stars that follow cooling tracks. These stars are assumed to have convective cores, an $n = 3/2$ polytrope, and no energy source other than the heat stored from gravitational collapse. There model indicates that for dwarfs of the age 10 billion years and masses ranging from 0.01 $M_\odot$ to 0.08 $M_\odot$, central temperature and density vary with stellar mass as $T_c \propto M^{1.38}$ and $\rho_c \propto M^{1.74}$. Given these $T_c$ and $\rho_c$ dependencies and knowing that $\phi_g \propto M/R \propto M^{2/3}\rho^{1/3}$, relation (7) yields a mass-luminosity relation mass dependency of $L \propto M^{3.6}$.

At the other extreme, we may consider and density variations for hydrogen-burning main sequence stars in the mass range $0.08\ M_\odot < M < 0.35\ M_\odot$. In the model of Dorman, Nelson, and Chau,[10] which uses the equation of state formulated by Fontaine-Graboske and Van Horn[11] and assumes an $n = 3/2$ polystrope, central temperature and density vary with stellar mass as $T_c \propto M^{0.65}$ and $\rho_c \propto M^{-1.41}$. Substituting these dependencies into (7) gives a mass dependency of $L \propto M^{1.8}$. Consequently, the genic energy mass-luminosity relation would be expected to have a mass exponent that lies somewhere between these two extremes; hence $1.8 < x < 3.6$, or in other words $x \sim 2.7 \pm 0.9$. By constructing an equation of state stellar model that includes genic energy as a principle energy source, the value of this exponent may be more precisely estimated.

## 4. THE PLANETARY-STELLAR MASS-LUMINOSITY RELATION

Harris *et al.*[12] performed a least squares fit to the log $L$–log $M$ data for two dozen lower main sequence stars having bolometric magnitudes fainter than +7.5 ($L < 0.07\ L_\odot$) and obtained a regression line of log $L = 2.76$ log $M - 58.55$, where $M$ is given in grams and $L$ in erg s$^{-1}$. Their data points and regression line are plotted in Fig. 2. Interestingly, the mass exponent of this mass-luminosity relation, $2.76 \pm 0.15$, falls close to the above theoretical median value of $x = 2.7 \pm 0.9$.

Veeder[13] has reported a substantially lower log $L$–log $M$ slope of $2.2 \pm 0.2$ for a sample of lower main sequence stars. However, he minimized the $y$-axis (luminosity) residuals in performing his least squares fit. Since the log $L$–log $M$ data slopes rather steeply and spans a relatively restricted mass range, minimizing the $y$-axis residuals tends to underestimate the actual slope and yield a skewed fit to the data. It is instead preferable to minimize the $x$-axis (mass) residuals. When this is done, the slope becomes $2.6 \pm 0.2$, a value that lies within $1\sigma$ of the Harris *et al.* value.

To check the positions of the heavy planets relative to the downward extension of the lower main sequence mass-luminosity relation, the intrinsic