STELLAR BIRTH

If the precepts outlined under The Primary Source of Stellar Energy are fundamentally sound, then other changes must be implemented to other aspects of theoretical astrophysics. One of these aspects would pertain to the current model of star formation. For the sake of physicists reading this who may have forgotten (or possibly were always oblivious to) the theoretical model of star formation, a very brief description is as follows. A large conglomerate of hydrogen gas forms in space in which the cohesiveness is maintained as a result of its own self gravity. Incremental motions of the atoms result in heat being generated. After millions of years, the heat would reach sufficient magnitudes to induce the attainment of thermonuclear fusion. At that stage a star would be established. (Although this model is exceedingly simplistic, it will suffice for our purposes.) If a photon's intrinsic energy is the primary source of stellar energy, then this model of stellar birth cannot be correct. For a star to exist (or even be created) there must be (a) phenomenal temperatures within the core; (b) an inordinate number of high frequency photons; (c) a high state of motion associated with the star. This situation would not prevail with a conglomerate of hydrogen gas. (Even though the galaxy which contained this conglomerate of gas would be moving, the conglomerate itself probably would not have a high orbital rate around the galactic centre.) The reader may wish to adopt the following position. Even if a photon's intrinsic energy is the primary source of stellar energy, the current model of stellar birth does not have to be dismissed. The current model of stellar birth would simply be relegated to the position of the first stage in the formation of a star. Once fusion was attained, it would be sufficiently hot within the core to induce a rapid acceleration of free electrons, thereby creating an environment that was "rich" in high frequency photons. On a point of this nature, there are scientific/logical reasons for seriously questioning the current model of stellar birth that are *independent* of the new science that has been presented at this web site.

Firstly, let's deal with the second law of thermodynamics. Since the second law is predicated upon statistical probability, it is physically possible for a system to spontaneously flow from a state of disorder to a state of order. However, (and this is critical) the probability of such an event if phenomenally low. It would be exceptionally rare for atoms to flow from a state of disorder to the ordered state of a conglomerate. Yet the current model of stellar birth dictates that this is transpiring on a fairly regular basis. Clearly, this is a violation of the second law of thermodynamics as a *decrease* in entropy, with any degree of regularity, is not allowed. I presented this argument to an astrophysicist. He countered with the following. Once a star is established, the entropy of the overall system dramatically increases as energy is then being distributed in an extremely disordered fashion. It would be difficult to successfully defend an argument of this nature. The period of time between the formation of the initial conglomerate and the establishment of the star could potentially be millions of years. When dealing with entropy, "time gaps" of this nature cannot be taken into consideration. What must be assessed is the overall entropy of a system *at the time that the system changes*. If hydrogen atoms form a conglomerate of gas, the overall entropy has decreased. It is not legitimate to state that the overall entropy increases merely because millions of years later an established star dissipates energy in a completely random manner.

There is a second reason for the current model of stellar birth being flawed which is independent of the new science presented at this site. If we have a conglomerate of gas which is gradually becoming hotter (via the random motions of the atoms), the conglomerate will reach a Maxwell-Boltzmann energy distribution. Prior to the establishment of this Maxwell-Boltzmann distribution, the self gravity of the system will be sufficient to prevent the atoms on the outer periphery from achieving escape velocity. However, upon the attainment of the Maxwell-Boltzmann distribution, the atoms on the outer periphery of the conglomerate will experience a dramatic increase in their average energy. At this stage, the atoms on the outer periphery of the conglomerate will be described by the following.

$$\text{K.E.}_{\text{(atoms on the outer periphery)}} = \sqrt{\frac{2GM}{r}} \qquad (1)$$

(Before proceeding any further, it is only appropriate to state the following. Although equation one is the "standard" equation for escape velocity, a new theory of gravity has been presented elsewhere at this web site. In that particular paper, the nature of the modification to this equation has been presented. However, for the sake of avoiding confusion in the presentation of *this* paper, this "standard" equation is being presented instead.)

Once sufficient K.E. is achieved, the atoms would diffuse away from the conglomerate. This would transpire well before the temperature became sufficiently hot to induce fusion. Although the overall energy of the system would be reduced (since the system has lost energy in the form of energetic atoms), the process would repeat itself. Specifically, the atoms on the periphery of the (slightly) reduced conglomerate would again gain sufficient K.E., achieve escape velocity, and reduce the overall size of the conglomerate. This process would continually be repeated until all of the atoms had diffused away and there was no longer a conglomerate left. Atoms have the greatest probability of remaining within a conglomerate if the temperature is sufficiently high to cause the atoms to fuse as opposed to a temperature which is only sufficient to provide the atoms with a sufficient K.E. to achieve escape velocity.

Therefore, there seems to be cogent reasons for seeking an alternative model to explain stellar birth. Firstly, at least two flaws seem to be present in the current model (specifically, entropy decreasing with regularity, and atoms on the outer periphery of a hydrogen conglomerate achieving escape velocity prior to the attainment of thermonuclear fusion). Secondly, new science has been presented pertaining to stellar dynamics which would seem to demand a new model of stellar birth.

According to the new precepts developed pertaining to stellar energy, it would seem that an energy system with a high state of motion and an extremely hot core which was "rich" in high frequency photons must be created. Is there any known phenomenon which would create a system of this nature? There is one known phenomenon which conform to these designated parameters. When a supernova explodes, some of the energy it releases into outer space could result in the development of a star. A cohesive vortex of energy released from a supernova would have a high state of motion and also possess a hot core with an inordinate number of high frequency photons. Furthermore, to state that stellar birth is the result of supernova explosions seems to be in accordance with certain principals. If the theory of the origins of the universe previously outlined is fundamentally accurate, then it was a state of *very high* energy that resulted in the currently observed universe. It would also seem that to create an energy system (which would result in a star) that conforms to the previously outlined parameters (a hot core, high frequency photons, and a high state of motion), a condition of, for lack of a better word, "violence" would have t o prevail. Very high energies would be required to create subsequent states of energy which possessed these characteristics. Only a supernova would conform to parameters of this nature. A more precise description of the pre-conditions required for stellar birth (when dealing with a vortex of energy from an exploding supernova) is as follows.

$$\text{Vortex of energy} = M \cdot \left(w^2 \cdot r\right) \cdot v \qquad (2)$$

(Units would have to be created for this. Perhaps we could call it a mav. This would be the first letters of the terms mass, angular momentum, and velocity.)

A more precise description of why each term has bearing on stellar formation is as follows. Velocity is necessary as a result of the scientific tenets outlined in The Primary Source of Stellar Energy. For a high frequency photon to release its internal energy, it must be accelerated. Although a photon within the core of a star will not be accelerated, the motions that a star is subjected to would cause a newly emitted photon to have its frequency increased (this is rather simplistic and it would be best if the reader read the stated paper for himself). Therefore, if a star does not possess velocity, the primary source of stellar energy cannot take effect. The reader may feel that since we are dealing with a supernova, this factor should not be velocity, but acceleration. It is true that a vortex of energy from an exploding supernova would be initially accelerated. However, in equation two, what is being presented are the *necessary* conditions for stellar formation. It is not necessary for a vortex (or star for that matter) to be accelerating for a photon to release its internal energy. Consequently, since acceleration is not a necessary condition for stellar formation, the velocity of the vortex will be presented in the equation.

Another factor is the mass of the vortex. The need for a minimum mass when dealing with stars is fairly rudimentary. In "conventional theory" (namely, theory that is outside the realm of the new science presented at this web site) a minimal mass is required to initiate and establish thermonuclear fusion. However, since a new source of stellar energy has been postulated, why would a minimum mass be required for stellar formation? As has been outlined in The Primary Source of Stellar Energy, within a stellar core, there would be *very* few electrons which would conform to the requisite parameters for releasing a high frequency photon in the correct direction (as stated in the previous paragraph, if this is somewhat nebulous, please read the paper to gain a better comprehension of what is being proposed). Furthermore, a minimum amount of energy would be required to accelerate the electrons to the requisite speed. The way to achieve the requisite energy and have a sufficient number of electrons which conformed to certain parameters, would be via a minimum mass. (Whether this would be one tenth of a solar mass, as contemporary theory pertaining to stellar fusion dictates, I cannot state).

Finally, in equation two, the term, $\left(w^2 \cdot r\right)$ is fairly important as it pertains to the energy vortex. When a vortex of energy is "ejected" from an exploding supernova, what will prevent the energy from dissipating into the vacuum of space? *A high angular momentum about its own imaginary axis.* This factor is *required* to maintain the cohesiveness of the energy vortex. It is angular momentum which will induce the requisite centripetal forces to maintain the cohesiveness of the energy vortex.

In equation two, velocity is independent of the mass and angular momentum. However, if a vortex of energy from an exploding supernova is to maintain its cohesiveness, then angular momentum must be proportional to the mass of the energy vortex. This is for the simple reason that the greater the energy, the higher the centripetal force (via angular momentum) must be to maintain the cohesiveness of the vortex.

The reader may raise immediate objections to the theoretical proposal of the conditions created by supernovas giving birth to stars. If this were true, then there should be certain observable ramifications. When a supernova explodes, it should give rise to a multitude of new stars within an observable distance of the supernova. If this theory is correct, when the supernova of 1987 exploded, there should have been new stars somewhere within its observable vicinity. Since no new stars have been witnessed, this theory is obviously wrong. This argument can be contended with via the following.

For a supernova to result in the birth of new stars one primary pre-condition must be fulfilled. For a supernova to produce new stars, we must be dealing with an extraordinarily high mass. The rationale behind this is as follows.

Firstly, the need for a minimum mass when dealing with stellar formation has been previously outlined in this paper. The second reason for requiring a massive supernova is far more important. When an individual energy vortex is ejected from a supernova, what is its angular momentum contingent upon? Via the conservation of angular momentum, angular momentum of the individual energy vortex is contingent upon initial angular momentum. Specifically, the angular momentum of the initial star/supernova. The angular momentum of an individual vortex may have to be very high to maintain its cohesiveness. This is for the simple reason that energy, due to its intrinsic nature, can easily dissipate into the vacuum of space. Therefore, the initial star/supernova may have to rotate very rapidly to imbue a subsequent vortex (at the time of explosion) with a sufficient rate of rotation. If this high rate of initial rotation were not achieved, the subsequent vortices of energy would not possess sufficient angular momentum to maintain their cohesiveness. The energy of these vortices would dissipate into space.

How would the initial star/supernova achieve a very high rate of rotation? This would be achieved if the star was very energetic. How would substantial energies be achieved? Via substantial mass. This now raises the question. Would contemporary population I and II stars possess the requisite mass/energy (and subsequently rate of rotation) to give rise to new stars at the time of their explosion? In all probability, no. This then begs the question, what stars *would* possess sufficient mass/energy to give birth to new stars upon reaching the supernova stage?

From the early universe, population III stars would possess sufficient mass, energy, and angular momentum to give birth to stars at the time of their explosion. Although there is a lack of reliable empirical data pertaining to population III stars, it is my understanding that the prevailing view is that population III stars were *significantly* more massive than either population I or II stars. Their masses could have run to millions of solar masses. Masses of this magnitude would be more than sufficient to produce other stars once their evolutionary sequence brought them to the supernova stage. Therefore, almost all stars we see today are the result of supernova explosions from population III stars in the early universe. Therefore, the argument that no new stars are observed in the vicinity of the supernova from 1987 does not necessarily invalidate the concepts outlined in this paper. Contemporary supernovas probably do not contain sufficient mass/energy that is required to imbue subsequent vortices of energy with the angular momentum necessary to maintain their cohesiveness.

The reader's (presumed) opposition is understandable. The concept of rare stellar birth in the present universe is contrary to conventional thinking. However, the reader should keep some of the following precepts in mind. Firstly, the reason for opening my own web site as opposed to sending my work through the journals is that it is very difficult for an unknown person to have unconventional concepts published (this was explained in somewhat greater detail in the E-mail sent to professors making them aware of this web site). Furthermore, there are *many* concepts being proposed at this site which are contrary to conventional scientific thinking. Secondly, astronomy is not like physics. In astronomy we do not conduct controlled laboratory experiments the way we do in physics. We simply proceed with our observations and make inferences on the basis of those observations. Nobody has ever seen an actual star form.

Finally, consider the following points.

1. The existence of the solar neutrino problem shows that something is very wrong somewhere in our theories.
2. As a result of my analysis of light in the physics section, these principles must be extrapolated to stellar dynamics. When this extrapolation is implemented, the solar neutrino problem is solved.
3. If the new analysis of stellar energy is correct, the theory of stellar birth must also be modified.

If the reader takes into appropriate consideration all of these factors, then hopefully the idea of rare stellar birth in the present universe is not quite so unusual.