Seminar explores new theories on the formation of planets and stars

by Carol White

Almost 400 years ago, astronomer Johannes Kepler laid the basis for modern astronomy. While he is best known for his three laws of planetary motion, his primary interest was to develop a theory to account for the creation of the planets. In neither respect has his work been qualitatively superseded to this day. The reason for this is that scientists have been diverted from Kepler's path into the sterile direction of Newtonian physics.

Recently a three-day science seminar was held in Virginia, with presidential candidate Lyndon H. LaRouche, Jr. The topic was a modern approach to astronomy from the point of view of Kepler. Present were the well-known Mexican astronomer, Dr. Luis Carrasco, and members of the editorial board of the *International Journal of Fusion Energy,* Drs. Tennenbaum, Moon, Bostick and Parpart, myself, and members of the Fusion Energy Foundation staff. The major subject under discussion was astronomy.

For almost two decades, Dr. Carrasco has been studying the process of structure formation in the universe. The most exciting feature of his work is his acknowledged debt to Johannes Kepler (1571-1630). Only recently has mainstream astronomy recognized just how correct Kepler was in identifying the crucial role of the magnetic field in the process of planet and star formation as well as in governing planetary orbits.

Carrasco has generalized this method to apply to the formation of galaxies and clusters of galaxies as well. Kepler's Third Law, which relates the period of revolution of the planets to their distance from the sun, has been generalized by astronomers to estimate the relative mass of the Sun and Earth. The comparison is made between the orbit of the Moon around the Earth at a given distance, and the predicted period of a body around the sun at the same distance.

This is represented in the equation $R^3/T^2 = M$, where R is the mean radius of the orbit, T is the time of revolution, and M is the mass.

Carrasco has generalized this as a relationship between what he calls specific angular momentum and the mass of the structure in question. The correlation he finds can be expressed as:

ωR^2 is correlated to $M2/3$, where ω is the orbital angular velocity.

The Carrasco law implies a lawful relationship between the radius of a planet and its mass. Such indeed was also asserted by Kepler. Empirically, he has found that the specific angular momentum does correlate with a value of mass—which implies the relationship between mass and radius implied above.

Carrasco's theory

Carrasco has discovered this relationship as a byproduct of his study over the past 17 years of the connection between the reduction of angular momentum and the formation of planets, stars, galaxies, and clusters of galaxies. He began this work by studying the activity of sunspots which provide a means of measuring the spin angular momentum of stars.

He contends that these sunspots are intimately connected to the generation of solar flares. Synchrotron radiation from solar flares provides a means of detecting them. These solar flares are the vehicle, according to Carrasco, through which the sun sheds angular momentum, partly by losing mass, but mainly by the interaction of the magnetic field carried out of the star and the plasma gas disk surrounding the star. This magnetic field of the flare remains connected to the star, and therefore transfers angular momentum to the plasma gas disk as it is dragged through this disk by the rotation of the star.

As is well known, the angular momentum of a rotating body determines its stability. Therefore, for a star to form, there is a maximum angular momentum which it will tolerate. If the angular momentum of the gas from which the star is to be formed is too great, then centrifugal force will prevent its formation. Carrasco has determined that the angular momentum does not operate as a maximum allowing star formation to occur at any point below that maximum. On the contrary, star formation seems to occur only at preferred bands of angular momentum—such that there is also a minimum angular momentum necessary to allow for star formation.

This result is not predicted by mechanical theory. This being the case, Carrasco has looked for a process by which angular momentum is shed which will then correlate to a rate of star formation. This implies, for stars like the Sun, a time in which they had a far greater angular momentum than at present. In the early period of the Sun's life, it would have been rotating at a far greater speed than currently and would have been experiencing a great deal more flaring. This process appears to be important to understanding the morphol-

ogy of all stars. Carrasco predicted that high levels of solar flaring should be seen in the case of young stars. This was corroborated within the past few years when the Einstein x-ray detecting satellite observed such high levels of solar flaring in young stars.

In 1958, Winston Bostick predicted that the plasma effects which he was observing in a laboratory situation, with his plasma focus experiment, would be discovered in the activity of stars and galaxies. In particular he singled out the development of vortex filamentary structure. Recent observations seem to corroborate his hypothesis. Bostick argues that phenomena such as sunspots are like the plasmoids which he has observed in the laboratory. He hypothesizes that flaring on a large scale occurs when two such vortices come together so that their magnetic field lines coalesce and are transformed into flares. The shock wave created by this flaring in turn detonates smaller flaring over the surface of the star.

Carrasco has observed a correlation between the mass of stars and the degree of angular momentum. He finds a linear relationship between, on the one hand, the logarithm of the ratio between angular momentum per unit mass, and, on the other, the logarithm of mass per se. In other words, both *exponential* functions—of the angular momentum and the mass—are correlated. He has also found that this correlation differentiates stars according to their age. That is, for the older stars with the same mass, their trend line will occur at an overall reduced angular momentum. The significance of this is that stars, regardless of their age, will tend to shed mass in a uniform manner over time.

The most massive stars have the largest angular momentum because they are not convective. Large stars have large stellar winds, but they are not magnetized, and therefore do not shed angular momentum to the same degree. Small stars shed angular momentum with great efficiency without the same degree of loss of mass. With this model, it is possible to predict the age of stars by criteria other than those currently used. This analysis has also been extended to binary stars, which also store angular momentum. Most stars are part of binary systems, even if one of the pair is no longer observable.

A step function graph of these logarithmic categories extends from the formation of planets and asteroids to the formation of clusters of galaxies. For each category of cosmic mass, there is a rising step, or line, crossing a diagonal linear trend line. The step indicates the relationship within a given category, while the trend line shows the interrelationship between categories. These steps are discrete quantizations. He has found a higher continuous function which makes the function continuous by introducing the mean density of cosmic mass into his equation.

Kepler's law extended

Except in the case of spiral galaxies which vary by a different law (the three-fourths power of mass) these cosmic structures vary according to the two-thirds power of the mass—which is a direct extension of the method of Kepler. Carrasco has accounted for the dissimilarity of spiral galaxies by a corrective factor. In general, spiral galaxies are less dense than elliptical galaxies. Star formation seems to occur in their arms, where a mean magnetic field has been located running through them. While it is clear that there is rotational action in the spiral arms, it has not yet been possible to locate vortex filaments along the lines discovered by Bostick, although Carrasco thought that these would most likely be present. In fact, the shape of the galaxies which he describes are similar to "barred" spiral formations seen by Bostick in his experiments.

The "mass" which Carrasco is addressing from the point of view of galaxies and clusters of galaxies indicates the process of star and galaxy formation. A galaxy with high mass has formed many stars. The relationship of the mass of a stable structure to its angular momentum, is not unique to Carrasco but follows well known mechanical "laws." What is unique is that he has found that these structures actually exist within narrow quantum bands, rather than within arbitrarily chosen "permissible" values which otherwise occur over broad bands. Furthermore, he hypothesizes that the formation of new structures can be directly connected to the rate at which the parent body sheds angular momentum. The present direction of his work is to get beneath the mass-momentum relationship to the magnetic field structure which is more basic to the process through which the universe creates itself.

Galaxies, as such, are divided into two main categories—spiral galaxies such as our own—and elliptical galaxies. The elliptical galaxies—ellipsoids with three different axes—are far more dense than spiral galaxies, yet they have less angular momentum than spiral galaxies by a factor of 20. Carrasco presumes that they have down-shifted by some law which is independent of their mass, in which the change of angular momentum per unit of angular momentum is a constant fraction related to time.

In a sense, stars keep a "memory" of the condition of their formation, maintaining themselves in relation to each other in galaxies. Elliptical galaxies have stopped the process of star formation. They have very little surrounding gas left, and this is ionized and therefore too "hot" to support continued star formation. Their lower angular momentum means that they accomplished their star formation at an earlier period. This is not the case with spiral galaxies which are still forming new stars. This offers another possible approach to the question of the red-shift. Rather than the usual interpretation that the observed red-shift represents an expansionary process in the universe, it may be due to a down-shift of frequency directly related to the work of star formation.

Carrasco has discovered another Keplerian relationship. Within galaxies there are peaks and valleys of angular momentum which occur at discrete intervals along radial distances from the center of the galaxy. Sharp peaks of star formation correlate with these valleys. In spiral galaxies these

discrete nodes of star formation occur within the spiral arms. The radial patterning suggests that the universe is structured in magnetic "sheets." This may indicate a global filamentary structure of the universe rotating as a whole.

In the discussion which followed Carrasco's presentation, Lyndon LaRouche emphasized the necessity of throwing out the so-called laws of physics and approaching the subject afresh from the point of view of Kepler. But for Kepler's method to be understandable to a modern audience, it is necessary to rework Kepler from the standpoint of Gauss's conical work functions.

LaRouche emphasized the falseness of Newton's notion of gravitational force. Gravity is merely the measure of the work done by an object when it moves out of a Keplerian, force-free orbit. In this sense it registers work done upon the universe. Newton's treatment of gravity as the pairwise interaction between masses was a deliberate attempt to stifle the advance of science. The practically useful calibration of the inverse square law was in any case first introduced by Kepler himself with regard to optics, and was only later applied by the secretary of the Royal Society, Robert Hooke, to transform Kepler's laws into the form of "Newton's" so-called law.

The approach by Dr. Carrasco is not only a fruitful application of Kepler's method, but very useful pedagogically. Therefore, LaRouche suggested that it would be very useful to present a morphology of cosmic species to help the student. He urged that such a classification of these different "animal" species be made available to as broad an audience as possible as quickly as possible.

The LaRouche hypothesis

LaRouche suggested his hypothesis that nuclear fusion can only occur as a polarized process for Carrasco's consideration. This would imply that the present assumption by astrophysicists that fusion in the Sun could not produce the heavy elements found on earth, *sui generis*, is incorrect, since a polarized plasma would raise the efficiency of the fusion process by as much as one order of magnitude.

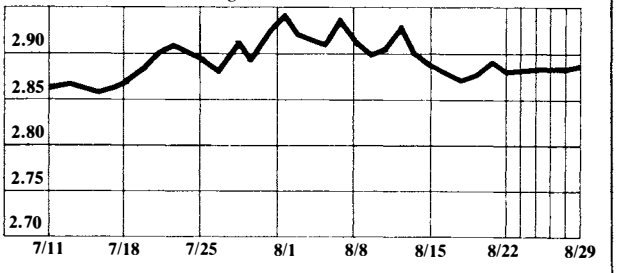
LaRouche also suggested that the gaseous disk surrounding the Sun was polarized and that the creation of heavy elements occurred there. This would have been part of the process of planet formation. Carrasco noted that there are very short-lived isotopes formed on the surface of stars, elements like technetium, which could not have been formed at their center and traveled to the surface because they are too short-lived.

While this is suggestive of corroboration of the LaRouche hypothesis, the isotopes are also too short-lived to have been cannibalized in the process of planet formation. Carrasco also noted that certain stars have a high metallic content. These stars have very high magnetic fields. In the same connection, he remarked that the spiral arms of galaxies emit polarized radiation which is diffracted through dust which has been aligned by the magnetic fields within the arms of the spiral.

Currency Rates

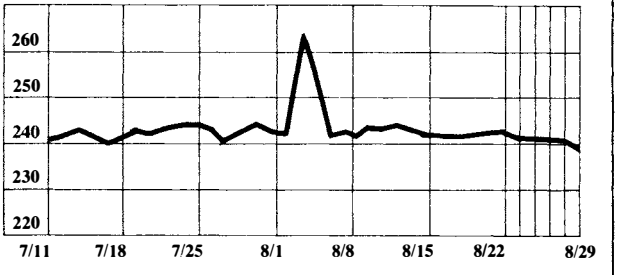
The dollar in deutschemarks

New York late afternoon fixing



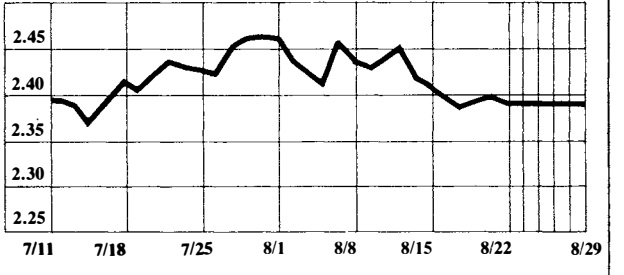
The dollar in yen

New York late afternoon fixing



The dollar in Swiss francs

New York late afternoon fixing



The British pound in dollars

New York late afternoon fixing