SECTION 6

The Effect of Prime Objective Space on Science

There are several areas or aspects of physics which must be treated completely differently in taking account of the prime frame and the consequent absolute space and absolute motion. These include:

[a] - the behavior of the orbital electrons of atoms in their effect on their line spectra and

[b] - cosmology and astronomy, in particular the behavior, history and future of the universe and the nature of space.

ATOMIC LINE SPECTRA

Fine Structure and Spin

When the line spectrum of Hydrogen is obtained with a spectrometer of high resolving power it is found that the lines that appear as simple single lines at low resolving power are in fact pairs of lines. This phenomenon is referred to as the “fine structure”. The splitting of the (low resolution) single line into (high resolution) two lines is on the order of about 1 part in 104. Sommerfeld addressed this problem showing that if the orbital electrons had elliptical orbits, in which the electron velocity would be relatively slow far from the nucleus and faster than for the circular orbit case near the nucleus, the relativistic mass increase at the higher velocity provided a minute energy increase that was on the order of the correct amount to account for the line splitting. That is, the elliptical orbit's energy would be slightly different from a circular orbit's energy.

Sommerfeld's model for how the fine structure arises, a model based upon the conceived direct motion and action of the electrons, was soon superseded by Quantum Mechanics, a model that seeks not to directly represent electron motion but rather to express the electron behavior and its effects. However, in spite of the wide spread acceptance of Quantum Mechanics, the concept of elliptical electron orbits has been retained.

Quantum Mechanics overthrew the Bohr-Sommerfeld theory shortly after its development. In Quantum Mechanics the fine structure is attributed to the interaction of the magnetic field due to the electron's spin on its own axis with the magnetic field due to the electron's orbit around the nucleus. This is referred to as “spin-orbit coupling”. The two cases that are contended to account for the two lines close together in the Hydrogen spectrum are for the electron's spin angular momentum vector in the same direction as the orbital motion angular momentum vector and in the opposite direction.

In multi-electron atoms the fine structure becomes various multiplet structures depending on the number of electrons, rather than the doublet structure of Hydrogen with only one electron. For multi-electron atoms the coupling possibilities are spin-orbit, orbit-orbit, and spin-spin.

In a sense the conception that traditional 20th Century physics has of the electron is of a powder of negatively charged minute specks compressed into a little ball. (One of the concerns of traditional 20th Century physics was that of what holds the electron together; with all of that charge packed so closely why does it not explode ?) In that sense, the electron is conceived of as spinning on its axis. It is conceived that the consequent circular motion of the specks of charge that are rotating about the electron's spin axis constitute a small current and generate a small magnetic field.

Actually, traditional 20th Century physics does not know, and has no way of knowing, whether the electron spins or not and if so then how rapidly, how (in traditional 20th Century physic's terms) the charge is distributed throughout the electron and what the electron diameter is, and so forth, all data necessary for calculation of its spin magnetic field. The contention of electron spin and its associated magnetic field depends entirely on that the concept is used to explain a fine characteristic in atomic line spectra. The amount of spin and the amount of consequent magnetic field is set by 20th Century physics at the value that explains the spectral fine structure.

In the present physics there can be no such concept, of course. Whether a *Center-of-Oscillation* can or does spin or not might conceivably be open to question but would seem to be inconsequential and irrelevant. The Coulomb effect of an electron *Center-of-Oscillation* is an effect external to the internal structure of the center. There is no way that such an electron can have a magnetic field due to spin.

Fine structure is the result of each orbital electron's having one or the other of two possible slightly different energy states in its orbit. In traditional 20th Century physics the two energy states result from the electron spin angular momentum (and magnetic) vector being in the same or opposite direction relative to the orbital motion angular momentum (and magnetic) vector. Spin in fact not being the cause because there is no spin, there must be some other cause that produces the same effect.

There is such another cause. That other cause is <u>absolute motion</u>, motion relative to the prime frame, the effects of which have been neglected until now in the treatment of the behavior of the atomic orbital electrons. Paraphrasing a portion of the earlier Section 4 - Motion and Relativity:

> "There exists throughout the universe a background radiation which is the residual radiation from the immense energy of the "big bang", the start of the universe. ... This radiation is, of course, relative to the beginning, relative to the U-wave medium. Measurements of Doppler frequency shift of this radiation due to the motion of the Earth give an absolute velocity for the Earth

relative to the medium of about 370 km/sec. The direction of the Earth's motion as indicated by those measurements is off in the direction from Earth of the constellation Leo."

The speed of the Earth in its orbit around the Sun is only about 31,000 m/sec so most of Earth's absolute speed is due to its motion relative to its galaxy, the Milky Way, and the absolute motion of that galaxy through space. Generally speaking it is likely that most if not all of the universe has a comparable magnitude of absolute velocity directed radially outward from the location of the original "big bang". (This is treated further in Appendix E, “The 'Big Bang' Outward Cosmic Expansion”) But, whether or not, this absolute velocity of our Earth and our entire planetary-solar-galactic system of about $3.70 \cdot 10^5$ m/sec $= 0.0014 \cdot c$ must be taken into account in considering the behavior of the orbital electrons.

The most important factor in the stability of an atomic orbital electron is that it must not radiate energy. That requires that it experience no changes in the shape of its *Propagated Outward Flow* pattern of propagation forward, rearward and sideward. And, that requires that its speed remain constant. But, the speed of an orbital electron has two components: its orbital speed relative to the nucleus and its absolute linear speed because it is part of our overall solar system motion in space.

In order for the electron to avoid radiating, it is its net speed, the resultant of those components, which must remain constant. The way in which those two components combine to produce a net electron speed at any moment depends upon the orientation of the electron's orbital plane relative to the absolute velocity component of the electron, its atom and its solar-galactic system. The effect is illustrated in Figure 6-1, below.

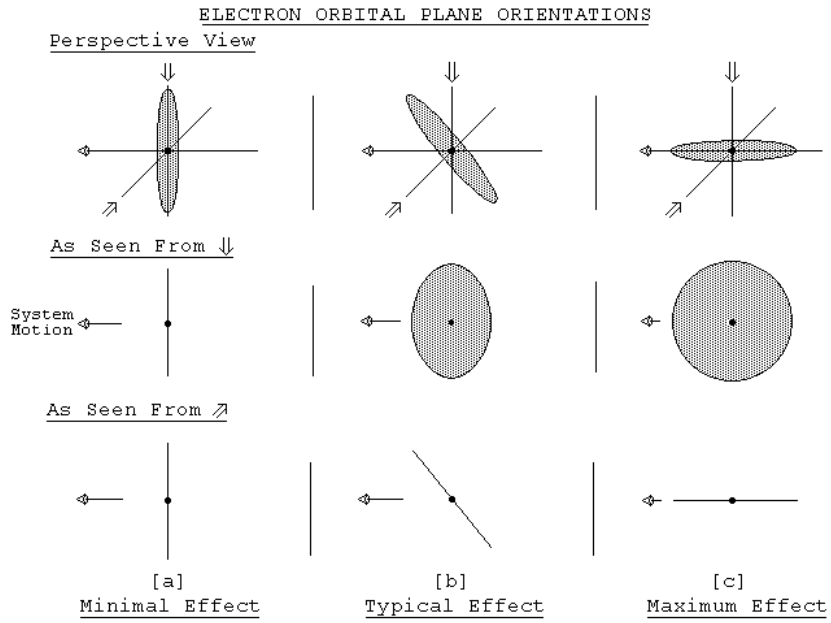

Figure 6-1
Relative Effect of Absolute Motion on Various Orbital Electrons

The figure illustrates different ways that the plane of an orbital electron's orbit can be oriented relative to the absolute motion of the atom's nucleus. If the orbital plane is oriented at right angles to the direction of absolute motion, as in the [a] Minimal Effect column of the figure, then the absolute motion produces the same change in the overall electron resultant speed everywhere in the orbit. The electron's total speed is that resultant. Its orbital speed relative to the nucleus is the circular orbit speed for that orbital shell as already analyzed and presented.

On the other hand, if the orbital plane is oriented parallel to the direction of absolute motion, as in the [c] Maximum Effect column of the figure, then the overall resultant speed of the electron varies between the sum of its circular orbital speed and the absolute motion speed and the difference of the two speeds (see Figure 6-2, below). In general, orbital planes are frequently oriented between those two extremes as illustrated in the [b] Typical Effect column of the figure. For such cases the absolute motion can itself be resolved into two components: one at right angles to the particular orbital plan (Case [a]) and one parallel to it (Case [c]) and the resulting overall effect analyzed in terms of a combination of those two extreme cases.

Figure 6-2, below illustrates the analysis of Case [c] Maximum Effect.

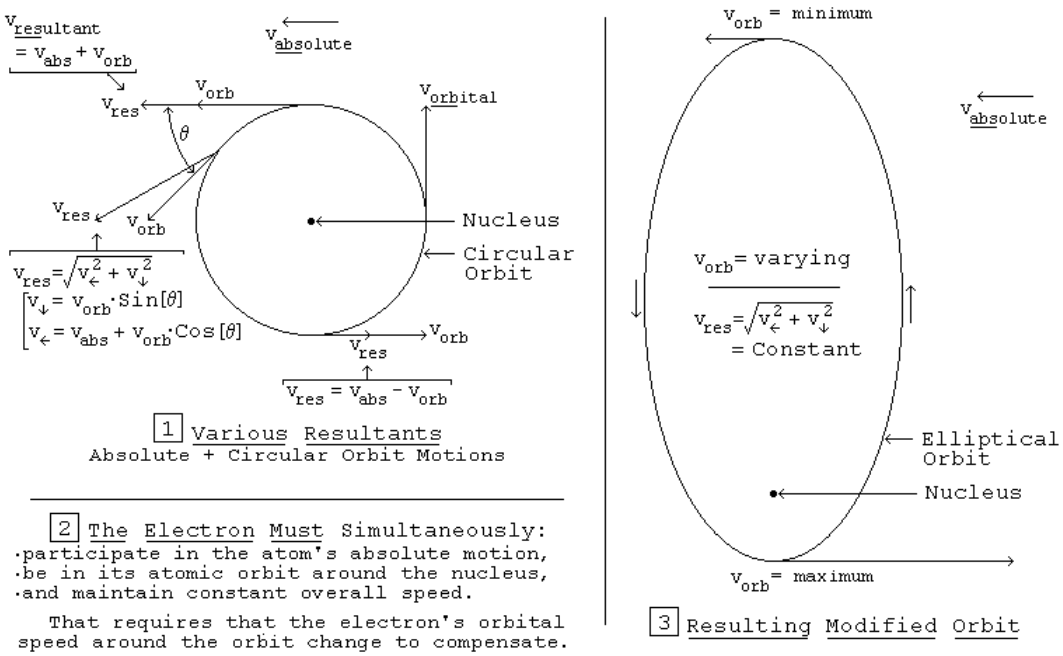

Figure 6-2

The figure is largely self-explanatory. If the electron is in a circular orbit (with consequent constant orbital speed) then the effect of the atom's absolute motion is to vary the electron's absolute speed, which is not acceptable. The only solution, the only *modus operandi*, is for the electron orbital speed to vary so as to compensate for the absolute motion and maintain constant absolute electron speed as shown in box 3 of the figure. The result is elliptical orbits for those orbits in which the orbital plane is not

perpendicular to the direction of absolute system motion, that is for those orbits of Cases [b] or [c] or Figure 6-2.

The circular orbit speed in the $n = 1$ orbit of Hydrogen is about $2.2 \cdot 10^6 \cdot m/sec$. Our absolute speed is about $3.70 \cdot 10^5\ m/sec$. The successive orbit speeds for $n = 2, 3, \ldots$ are $^1/_n$ times the $n = 1$ value. Thus the effect of absolute speed and the variations in orbital speeds are quite significant.

It is interesting to recall that the system of orbital quantum numbers developed by 20th Century physics and particularly elaborated by Dirac, used the convention of the projection of an orbital angular momentum vector on a reference axis to define the various orbital tilts. It has now here been found that the tilts are the direct result of the space required for the matter wave of each orbital electron and the tendency of the electrons to space themselves as equidistant from each other as the circumstances permit. And it has now here been found that the "reference axis", an imaginary and missing element in traditional 20th Century physics terms, is actually the orbital plane orientation relative to the atom's absolute motion in space. The $l = 0$ value corresponds to the electron orbital plane being at right angles to the absolute motion, Case [a] of Figure 6-1. The $l = 1$ value produces a Case [b] situation.

That kind of orientation situation is illustrated as an example in Figure 6-3 below. The orbit depicted as horizontal of Figure 6-3 is depicted deemed at right angles to the absolute motion and is therefore circular. The other two orbits of the figure are thus found to be forced to be elliptical, a pair tilted at equal but opposite angles relative to the absolute motion of the atom.

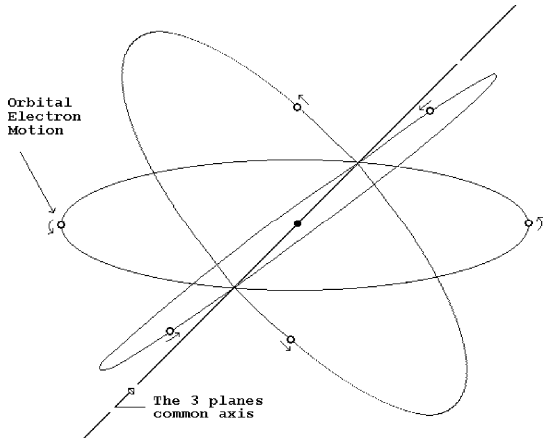

Figure 6-3
Three Orbital Planes and Relative Tilts, n=2 Shell

Returning to the problem of the cause of the fine structure in atomic spectra, there is a second consequence of the orbital electrons' absolute motion. Each electron has a component of magnetic field due to its straight line motion in space in addition to its orbital motion magnetic field. The electron's orbital magnetic field, which is perpendicular to the plane of the orbit, tends to align with the linear motion magnetic field that is due to the atom's absolute motion, which field is circumferential to the electron's direction of absolute motion. There are two possible alignment orientations, that is two orientations when there is no force acting that tends to change the orientation

to one of the two. One is orbital motion in the same direction as the absolute motion magnetic field and the other is the opposite. The two differ slightly in energy. It is not "spin-orbit" coupling but "absolute motion - orbit" coupling that operates to produce the fine structure.

The electron's absolute motion magnetic field may seem to be rather weak for the purpose (just as would the magnetic field of a spinning electron so seem), but just as in the hypothesized spin-orbit coupling, both of the actions actually are acting at the same location, that of the electron.

Hyperfine Structure and Spin

High resolution spectral techniques, including the use of tunable lasers, disclose an even more closely spaced splitting of spectral lines which is called hyperfine structure. Analogous to the quantum mechanical explanation of fine structure in terms of hypothesized orbital electron spin, the hyperfine structure is attributed in Quantum Mechanics to nuclear spin, its consequent magnetic field, and its interaction with the electrons. But, the nucleus can no more have a spin magnetic field than can an orbital electron. In this the present physics that is clear for the case of Hydrogen where the nucleus is a proton, a simple *Center-of-Oscillation* however it is also true of all atomic nuclei.

The hyperfine structure stems from electron orbital magnetic field interaction with the magnetic field due to the nucleus' absolute motion in space. Of course, overall the nuclear and orbital electron absolute motion magnetic fields cancel out since the direction of absolute motion is the same but the polarity of the moving charges are opposite. However locally, within the atom there is not general cancellation.

COSMOLOGY AND ASTRONOMY

The Universe's Center and Edge

The physics of relativity has affected cosmology and astronomy by strongly establishing the interpretation or understanding that, in effect, the universe has no edges and no center. The lack of edges is not taken to mean that the universe extends forever; rather it is taken to mean that the space of the universe curves and that if one were to travel long enough in what seems to that traveler to be a straight line he would end up "coming up behind himself where he started".

Furthermore the relativistically conceived universe has no center. In spite of what seems a reasonable assumption, that the center of the universe is where the first moments of the Big Bang took place, that reasonable assumption is denied.

However, the fact of the prime frame of reference, the rest frame, changes all of that.

The prime frame of reference, the rest frame, is the only objective frame. All others are subjective points of view of the observers involved. The fact that our subjective point of view seems reasonable to us, seems "normal" is of no consequence. We live in the prime frame whether we think we can detect it or not; it is the entire universe.

At the instant of the Big Bang a radially outward expansion began and it is still going on. We on Earth are out some large number of light years in one generally radial direction from where that Big Bang started. If we imagine a sphere cut in half to a pair of hemisphere's flat sides facing each other with our outward radius in one of the hemispheres and located where it forms an invisible boundary between two equal quarters making up our hemisphere, then the vast universe we see around us is more or less half of the total. Everything in the other hemisphere is moving away from us and we shell never succeed in having anything to do with it.

So, "our" universe is half or less of all that the Big Bang produced. That doesn't really matter; it is more than enough for us. Yet, just as we are curious to study and learn more about our universe we would like to know about that other half with which we will never interact. The best that we can do is to envision the history of our "half" of the universe.

The mistaken conception that the universe has no edge and no center led to a generally mis-conceived set of conclusions.

- First, is the failure to detect and investigate the universal exponential decay in spite of the substantial evidence for it, see below.
- Second, is the errors in the Hubble Law and theory [see next page]. A number of years ago in about the 1990's the estimates of astronomers and astrophysicists were that the earliest galaxies took about 2½ to 3 billion years to form, that is, that they did not appear until 2.5-3.0 billion years after the Big Bang. Those estimates were based on analysis of the processes involved in star formation and in the aggregation and "clumping" of matter in the early universe.

  Since then improved equipment and techniques [e.g. Keck and Hubble telescopes and gravitational lensing] have resulted in reports of observation of early galaxies having stars that formed as early as 300 million years or less after the Big Bang.

  Such new data has led to the abandonment of the several billion years estimates of the time required for star and galaxy formation and to the adoption of unexplained and unreasonable assertions that early galaxies formed as little as a few hundred million years after the Big Bang. However, an alternative response to those recent data would be to re-examine the Hubble theory from which the age of the universe and the distance to high redshift objects is determined.

- Then, there is the vast error in the age of the universe and in distances to far distant cosmic objects, see Appendix E, "The "Big Bang" Outward Cosmic Expansion".

The Universal Exponential Decay

Since the "Big Bang" the *Propagated Outward Flow* has been gradually depleting the original supply of *medium* in the core of each *Spherical-Center-of-Oscillation*, depleting the amount that drives the *Propagated Outward Flow* through the surface of the core. That process, an original quantity gradually depleted by flow away

of some of the remaining quantity, is an exponential decay. Appendix D presents the description of "The Universal Exponential Decay" and the evidence for it.

In the absence of the demonstration that there is a prime frame of reference and the resulting adjustments and conclusions about the universe, the scientific environment was not conducive to investigating the universal decay in spite of the evidence for it. It can be hoped that Appendix D now rectifies that problem.

The Hubble Law

Analysis of the Hubble Law shows that it is asymptotic to an age of the universe that depends on the value of the Hubble Constant. See Appendix E, "The 'Big Bang' Outward Cosmic Expansion", equation *E-41* and Figure E-8. The value of the Hubble Constant is generally taken as in the range of *60 to 75*, but its value remains to be determined. The current generally accepted age of the universe is *13.7 billion years*, which corresponds to a Hubble Constant of *67*. The most recent [2012] determination of a value for the Hubble Constant is *74.3 ± 2.1*.

For high *z* cosmic objects the Hubble Law results in recession velocities approaching the speed of light. That those velocities are attributed to expansion of space, not to actual velocity of the objects, does not really relieve the problem. According to the Hubble Law the distance between we the observers and those far distant cosmic objects is nevertheless increasing at a rate almost the speed of light which is unreasonable for such immense masses.

The problem of sufficient time after the Big Bang for stars to form, the unreasonable recession velocities implied by the Hubble Law, and even that the Hubble "constant", on which those all depend, is so poorly determined and appears to not be subject to better determination, would all evidence that the Hubble theory is defective and should be replaced.

The "Big Bang" Outward Cosmic Expansion

In the absence of the demonstration that there is a prime frame of reference and the resulting adjustments and conclusions about the universe, the scientific environment was not conducive to investigating the radially outward expansion of the universe from the central source of the Big Bang.

Appendix E rectifies that situation and develops the outward cosmic expansion under the influence of the initial outward explosive energy and the subsequent on-going exponential decay.

The analysis of the prime "at rest" frame of reference produced these useful and beneficial effects of absolute space on science.

More importantly that analysis leads to discovery of the prime universal standard of time and the combination of absolute space and absolute time help resolve a major problem having an adverse effect, not merely on science but on overall human society.

Next: Section 7 – Absolute Objective Time