The Parable of Millennial Physics

Much has been said in popularized science in recent years (this was written before the turn of the current century) about the relationship of Eastern religious philosophy and 'modern' physics, i. e., as *mass*ively pursued in *The Tau of Physics*, *The Dancing Wu Li Masters*, etc... Although quite entertaining stuff, First Corinthians 13:1 comes to mind: "Though I speak with the tongues of men and of angels, and have not charity, I am become as sounding brass, or a tinkling cymbal." (I will refrain as usual from stating explicitly that this is all "in my humble opinion," leaving it for the reader to assign degrees of charity and humility, respectively, to my *modus operandi* and opinions as they see fit.) I am not proposing here to replace such bad analogies with worse ones that might be derived from our more familiar Judeo-Christian tradition or religico-philosophical positions, but there is something about *Jesus* here – the *man*. "*Son* of Man" if you must, but the *person* at any rate – the one who according to our traditions tromped the arid hills and valleys of Galilee plying minds with *parables*. It is that *modus operandi* as against the creed attributed to him to which I will rely.

Now one can certainly push analogies too far, which is my complaint with approaches cited in the previous paragraph, but there *is* an aspect of analogies that works when all else fails. I'm sure that every teacher has at one time or another fallen prey to the *parabolic mood* that characterized so much of Jesus' teachings. The *experts* in his field had their own arcane words and concepts without which they could not even reason. They tried to show to anyone interested in his ideas that the concepts must be invalid because they were incompatible with their own *accepted* ideas. So Jesus attempted to frustrate their efforts using demonstrations and parables about which one could – and indeed *had to* – reason without the usual props. So…so much for that.

Now, about physics at the turn of *this* century one could say that other than there having elapsed an interesting hundred years, we are right back where we came from. We have, according to Hawking and others, a couple of details to be worked out in our theories and then physics will settle down to the orderly 'stamp collecting'[1] procedures of the other sciences. Hmm. Of course the solutions of these *little problems* are being sought in the interstices of the "quantum foam" supposed to exist beneath the limits of uncertainty where space itself breaks down in the measurement of separations less than the 'Plank distance', i. e., less than 10^{-33} centimeters. How small is this distance? Well, if you could scale yourself down ala *Alice in Wonderland* such that a single atom became by comparison the size that is supposed for our entire universe – a 14 billion light year radius – you would then have shrunk to the Plank length in height. So you can see by such analogies that our remaining problems are conceived as being 'little' indeed. So, other than this brief synopsis of their diminutive stature, what can be said about the remaining problems in physics that Edward Witten is whittling away at with Microsoft money?

Well, primarily it is this *minor* little problem of *major* incompatibilities between what all physicists agree to be virtually faultless theories of relativity and quantum mechanics. Hmm. They choose to characterize this incompatibility as the disparity between an implicitly continuous 'fabric of spacetime' on the one hand and implied discontinuities in spacetime, albeit at the quantum foam level, on the other. This is seen by theorists in both camps as a fair representation of problems associated with matter having been incorporated as continuous field functions into spacetime itself by general relativity whereas quantum mechanics has been formulated as the mechanics of *point* particles albeit distributed statistically. So in essence two teams of experts have worked at great

[1] The remark, "Relative to physics, all other sciences are just stamp collecting," is attributed to Rutherford.

length on separate ends of a tunnel on opposite sides of a major fault line through a mountain and now their *only* problem is that the tunnels do not meet. Hmm. So, now rather than consider whether one or the other (or both) tunnels were ill-conceived from the outset inasmuch as they should at least have been built on the *same* side of the observation fault line, both teams confer at the ends of their respective tunnels wondering how on earth the other tunnel could be modified to reach them. Meanwhile, the mountain rumbles.

The Parable of Point Particles

A certain philosopher sat out to discover the nature of the interactions of material particles because the old models of point particles had all failed. He formulated the interaction using the old model that had failed but as an exercise substituted imaginary numbers and derivatives where the old model had indicated real quantities and vectors. Since what had been *ordinary* equations now became *operator* equations, he assumed a function on which the operators could act. Solving his new equations, he realized that since they resulted in complex numbers, he must somehow square the numbers[2] to obtain real numbers that he could then compare with real measurements. The result provided a distribution function rather than a specific location for an interacting particle. So, having used a bastardized version of a *point particle* equation he had obtained a *distribution* rather than a *point* location for the particle, which strangely did not strike him as a *reductio ad absurdum* argument against point particles or his approach. But to his understandable amazement there was agreement with real interactions at a statistical level although obviously not on individual measurements. The philosopher, therefore, maintained that matter was indeed comprised of point particles but that you never know exactly where they are going to show up.

The Parable of a Continuous Spacetime

Another philosopher sat out to discover the illusory nature of light. Since light had been shown to propagate independently of the motion of the earth about the sun, he reasonably concluded that space itself is 'nothing' other than a measure of the separation of observable objects. He, therefore, formulated a space-independent set of equations for the interaction of light with matter. The equations accurately predicted observations. But he noticed that according to these equations emission and reflection events seemed to occur where the kinematics of moving objects did not determine their sources and lenses to have been at those specific times. He, therefore, hypothesized further that the objects had been contracted because of their motion relative to the observer and that the timetable of events that made sense for that object had been dilated for objects in relative motion. In this way the traditionally accepted laws of kinematics could be made to agree with observation. So based on his work it was accepted that there is a spacetime continuum quite independent of 'separations' of objects, and that it is distorted by motion such that objects are not where they appear to be after all. This was later extended to incorporate gravitational distortions that could be seen as equivalent to distortions due to accelerated motion.

Mending the King's Garment

What king is so impoverished that when his costly robe hath been rent, he sendeth his servants to the far corners of the earth to purchase fine satin and then assigneth the same seamstress, whose

[2] A 'complex number' times its 'complex conjugate' is a 'real number'. It is that to which we refer here.

lack of skill resulted in the original embarrassment to the crown, to mend the old garment? Doth he not rather send his servants also to find new cloth and a new seamstress to create for him a new robe without rent?