Essay 48: General Relativity With Metric And Connection

The metric was inferred in the early nineteenth century by Riemann and the connection in the eighteen sixties by Christoffel. These are two different objects of geometry. In a nutshell there are two different types of general relativity, the one which has just collapsed in a heap in UFT 193 and 194 is based on the metric, from which is constructed the infinitesimal line element. One can try to salvage something from the disaster by using the Crothers metric, but at the expense of unknown parameters called A, B and C. The infinitesimal line element theory is no longer a predictive theory. In order to progress from this point the field equations of ECE theory can be used because they are constructed with the connection rather than with the metric. In the now obsolete Einsteinian general relativity (EGR) the way in which the connection was related to the metric was based on the use of three compatibility equations. That method is completely wrong because of its use of a symmetric connection.

So the only way in which cosmology can progress as a scientific subject rather than one eternally bogged in mythology is to use the field equations of ECE. Whenever the metric is needed the Crothers metric must be used. It is no longer possible to develop general relativity in any spherical spacetime depicted with one simple function m. It is known that one of the gravitational field equations of ECE theory reduces to the Hooke Newton law of universal gravitation, and therefore gives an elliptical planetary orbit. Therefore the precessing elliptical orbit can probably be constructed from a choice of connection. The relation between the metric and the connection will be complicated however, because the metric cannot be described by a single m function. General relativity based on the infinitesimal line element therefore becomes a philosophical framework rather than a predictive theory.

The advantage of general relativity based on the connection is that it is first and foremost rigorously correct and provides a framework for a unified field theory, the ECE theory. The ECE theory provides field equations both of electrodynamics and dynamics which have the same overall structure. Both sets of equations incorporate the spin connection due to Cartan and can produce spin connection resonance under well defined conditions. This subject has been highly developed by Eckardt, Lindstrom and myself in recent papers. Spin connection resonance offers the best promise for energy from spacetime and counter gravitation. Therefore connection based general relativity is of great usefulness. Unlike metric based general relativity it is rigorously based on the two Cartan Maurer structure equations and the Cartan identity which when translated into tensor language is self checking.

The inherent weaknesses that led to the abandonment of the infinitesimal line element method include the following. When the tensor method was first inferred in about 1900 by Ricci and Levi Civita, the concept of curvature did not exist. Contrary to the impression given in numerous textbooks, neither Riemann nor Christoffel inferred curvature. The inference was made by Levi-Civita in the early twentieth century. The fatally flawed Einstein field equation was inferred in 1915, when torsion was unknown. So inherent in the field equation is the hidden assumption that torsion is zero. The concept of torsion was introduced later, by Cartan in the early twenties. If torsion is neglected or assumed to vanish, the connection has the wrong symmetry. On top of this basic error, many other errors were uncovered by distinguished scientists who all notified Einstein. The most severe errors were uncovered by AIAS scientists: the neglect of torsion, the incorrectness of the force law of general relativity, and the complete failure of line element general relativity in any spherical spacetime.

Although line element general relativity can probably be salvaged by the Crothers metric it becomes much more complicated. It is preferable for the reasons stated to retain general relativity via the field equations. Many physicists will prefer the lagrangian method of cosmology to general relativity, because of Ockham's Razor, and because lagrangian dynamics provides the correct force law of attraction from any orbit of any object in cosmology. The disadvantage of the lagrangian method is that it needs an empirical parameterization of an orbit. In the solar system this is not a problem, because the orbit is well known to be a precessing ellipse. In other objects of cosmology the orbit may not be known with anywhere near the precision of solar system orbits.

On the philosophical level the lagrangian dynamics are non relativistic, so the stated advantages of relativity are not present, notably the unification of fields of force with Cartan geometry cannot be achieved with lagrangian dynamics. What is clear however is that no progress at all in science will ever be made with dogmatism.