Particle and atom: Quantized geometrical structures in the single field (or The physical genesis of matter)

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Abstract. Science progresses by fits and starts and sometimes a fit is a sufficient enough advance to force significant paradigm changes and be classified as a scientific revolution. At present, physics is ruled by several paradigms, but only two, relativity and the quantum, are considered fundamental enough to spark a new revolution. It is claimed that the Newtonian paradigm has been completely overthrown by the quantum, but that is just not true although a new revolution will not come from that quarter. It is further believed by the majority of theoretical physicists that the quantum theory is more fundamental than relativity, which is not true, so most presently attempted unification theories are not unifications at all but cases of the quantum theory attempting to replace relativity completely rather than unify with it. The quantum (discrete and indeterministic) and relativity (continuous and deterministic) are almost universally thought to be mutually incompatible, but that belief is also untrue.

The reality is that for any advance toward unification in physics to be made, whether it is real unification or partial and limited, any new theory must be able to explain in its own terms all of the phenomena that were successfully explained by the previous theory that is being replaced. Short of this, a new unification theory will not be able to replace the old theory successfully. In the case of the quantum versus relativity, quantum theories invent new particles (gravitons and gravitinos) to explain phenomena almost as quickly as most people would sit down for a cold ice cream cone on a hot summer day. Many other particles are predicted by the mathematics of the standard model (for example axions and supersymmetry particles), but have yet to be found in either nature or the experiments created to verify their existence, while other particles are said to be beyond the possibility of direct detection (gluons and quarks) and thus beyond normal verification.

The existence of quarks, which are absolutely necessary to the standard model of particles, as internal components of other elementary particles is only inferred and not directly detected or measured by the three-sidedness exhibited in high energy collision experiments. Quarks have never been directly detected as independent entities, so the traditional definition of particles was changed to allow them to be described as particles. So while the various particles in the particle zoo created by the Standard Model might explain (or explain away) phenomena that are easily explained by general relativity, they are still no more than either figments of researchers' imaginations or mathematical entities and derivations that may or may not ever be replicated the natural world.

On the other hand general relativity, which reduces to Newtonian physics at slow non-relativistic speeds and smaller masses, and has yet to fail in confirming any of its more bizarre predictions is very rarely used today as a basis for unification in the same sense that Einstein and a few others tried to unify relativity, electromagnetic theory and the quantum prior to the 1960s. The largest problem with general relativity today is its failure to adequately account for the quantum and the existence of DM and DE, while most attempts to explain DM and DE posit more hypothetical and imaginary particles to account for DM and DE. This is true even though Schrödinger's mathematical derivations demonstrated that his anti-symmetric theory was equivalent to Einstein's non-symmetric model plus the dreaded and

regretted cosmological constant which Einstein had abandoned. Einstein also tried to demonstrate how his theory could explain the motion of charged particles through the non-symmetric field, but his calculated results were insufficiently small and independent of the charge of the particle so he ended his search for the unified field hoping that some future scientist would eventually finish it.

Today we know that the cosmological constant can be interpreted as Lambda-CDM (although we do not know why) while Einstein's insignificant values and the independence of those values on electrical charge render the non-symmetric form of space-time curvature ideal for explaining DM and DE. Had Schrödinger and Einstein not been so closed-minded and set on using the anti-symmetric and/or non-symmetric parts of the tensor to explain electromagnetism, they could very well have predicted the existence of both DM and DE as early as the 1951. This conclusion demonstrates that general relativity is incomplete since it does not consider the point-elements along a curved Riemannian surface as well as the metric-elements upon which normal Riemannian geometry depends so heavily. This flaw in Riemann's differential geometry of surfaces was fully known to Riemann and mentioned in his paper originating the new geometry. In fact, at the end of his paper he stated that the true nature of physical space could only be found in the microscopic connections (the physical equivalents of the point-elements that he had ignored earlier in the paper) of space, whose smallest measurements he referred to as 'quanta'.

Given these facts, it is easy to see how to correct general relativity to account for DM and DE as well as introduce the correct interpretation of the quantum theory. Riemannian geometry has to be completed by showing how the point-elements on an *n*-dimensional surface affect the *n+1*-dimensional embedding manifold. Once this has been done, Kaluza's 1921 five-dimensional extension of general relativity, which is the only theoretical model that truly unified gravity and electromagnetism, even though some of his assumptions and deductions were a bit shaky (after all the five-dimensional geometry he used was itself incomplete), his theoretical model can be corrected and applied to completely quantize and unify the space-time continuum. Through this sequence of advances, a single field theory (SoFT) or what Einstein and earlier researchers called unified field theory has been developed. According to SoFT, everything – material bodies, physical fields, particles, atoms, and even life, mind and even consciousness – can be reduced to different single (potential) field structures and their variations through time within the overall five-dimensional space-time framework that we inhabit. Having completed this task, at least to the first order, it then becomes necessary to demonstrate that the successes of previous theories and paradigms can be successfully duplicated and predictions can be made that will allow the single field theoretical model to be tested and verified. This process is as it should be given the scientific and experimental methods that govern all of science and is on its way to completion.