Challenges of the Strand Model

As with almost all overly ambitious Grand Unified Theories or Theories of Everything, Schiller's strand model[1)] may be challenged by several upfront objections. Here we present a brief (yet incomplete) list of such objections.

1. Regardless of what many schools of thought promote nowadays, physics near the Planck scale is largely unknown and has no observable impact on either the Standard Model or classical gravitation (refer to the "cluster decomposition principle", for example). Attempting to construct fundamental geometrical objects near this scale is highly questionable and unlikely to describe reality.

2. Strands are postulated to be unobservable entities. In contrast, "crossings" (or switches) of strands are assumed to take place at a single point in space and be observable. The notion of crossing lacks physical meaning as the concept of "point" particles in field theory does, whereby Renormalization is the only available tool that deals with the inaccessible physics of short-time scales. Localization of "crossing" in space-time leads to singular values for energy and momenta and ruin the classical topology of ordinary space-time as a continuous and smooth four-dimensional manifold.

3. At our observation scale, "strand-like" structures are made out of substrates that can take deformation and stress in the sense prescribed by the theory of elasticity.

In other words, they may be characterized by “tension”. It is the “tension” that enables classical properties such as the ability to stretch, twist, bend or shear. These properties lack any physical meaning on ultra-short time scales as the concept of “tension” becomes ill-defined. Therefore, claiming that strands can form tangles that can cross in space is an ad-hoc and highly contrived metaphor.

4. The purported strand configuration assigned to the particles of the Standard Model is observer dependent and at variance with the Lorentz symmetry. In a reference system that is orthogonal, or positioned at an arbitrary angle to the plane where the crossing takes place, the number (and density) of crossings may change. As a result, there may be a disparity of observations on the rest masses and particle flavors between different frames, in stark contradiction with both theory and experiment.

Reference:

1) Christoph Schiller, “A fascinating speculation: the strand model”, available at http://www.motionmountain.net/research.html.