The evolution of embryo-protons into Bostick´s toroidal forms.

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Abstract:

In recent work we have drawn a quantitative picture of embryo-protons condensation in loop form, from a state at 3.7 GeV, which we freely associated to a “vacuum”. We then found evidence for the actual character of such a state from the flux profile of protons in cosmic rays, which indicates 3.7 GeV as the environment energy in equilibrium with embryo-protons after the big-bang. We here extend our arguments to suggest the connection with W. Bostick´s work on a filamentary-toroidal loop description of particles, which might probably be the final stabilized shapes of the simple loops considered in our work.

In recent work [1] we have drawn a quantitative picture of embryo-protons (loops of charge) condensation from a state at 3.7 GeV, which we freely associated to a “vacuum”. We then found evidence for the actual character of such a state from the flux profile of protons in cosmic rays[2,3], which indicates 3.7 GeV as the environment energy in equilibrium with embryo-protons after the big-bang.

We begin this discussion by inserting such finding into a pictorial representation of the Universe Time-Scale[4], as drawn by Olivier T. Godichet. This altered picture (Figure 1) makes very clear that the condensation of embryo protons in the form of loops would precede the stabilization of their inner constituents (i.e., it precedes the attainment of their definitive topology[5]). The final stage topology is not yet ready at 4 GeV, as indicated by our results. On the other hand, our results have shown that mass and magnetic moments of the proton and related baryons arise from the simple loop geometry. No detailed picture of inner constituents is as yet required. The question arises whether the final picture should necessarily be so completely different from this successful loop model, since this is the conclusion taken from QCD: a theory with no bridge to QED.

Our proposed interpretation sheds light on another issue, that of the structure of vacuum at such high energies (temperatures). It is well-known that the density would be extremely high in the initial microseconds of what we call Universe. The model proposed in [1-3] actually requires the existence of such a dense medium, where strong correlations-fluctuations might be established. Particles would condense in loop-form from fluctuations in such dense, strongly correlated medium at 4 GeV temperatures, something very different indeed from what the word vacuum presently means.

However, it seems that the attainment of a concrete description of how a particle would evolve from its embryonic form towards a definitive form is still hindered by a gap in knowledge(represented in the time scale in [4] by a cut line at about 1 GeV energy). Again, such line highlights the strange fact that QCD is so very different from QED, since they should be expected to merge into each other. Papers [1-3] demonstrate that

conventional (quantum) electrodynamics holds up to the embryonic stages of particles. An investigation should then be carried out to analyze how it might be extended into the realm of QCD, but it seems this is not possible without the help of geometrical models, and such models are not considered in QCD. In fact, one such investigation exists from the 1950s, but not in full theoretical terms. In a nowadays forgotten work, Bostick[6] developed an heuristic toroidal/string picture for particles which is able to associate EM theory, gravitation and strong interactions, including obtaining the G constant from EM arguments. An Experimental Plasma Physicist, Bostick had a life-long experience with plasma structures of all sorts, including those developed in outer and gallactic-scale space. His heuristic model was firmly based upon observations at large scale phenomena, and were extrapolated to the scale of particles. Bostick´s toroidal current strings are immediately associated with loops in our work. Standing (de Broglie) waves would circulate around the toroidal structure. A somewhat similar model was independently developed by the author years ago[7], which was eventually rewritten in FT terms and resulted into paper [1]. At this point one realizes that Bostick´s work actually needed its translation in FT terms, which was not done. As several other phenomenological models of particles previously proposed, Bostick´s model was static: there was no hint to trace how the loops would come to be. At some point in his discussion he used the word “spontaneous”,[6] but no mechanism was proposed.

We however see the link between Bostick´s work and the present investigations. A remarkable conclusion can be reached, which is that Bostick´s work might indeed describe particles in their definitive form, which would represent the extension of QED into what is now the QCD realm. The present work covers the genesis (from vacuum instabilities) of vortex/loop-like embryo particles, while in a latter stage Bostick proposes detailed geometrical structures for the same particles. He also proposes EM counterparts for the outcome of Gravitational and Strong interactions, and the nature of “gluons”. We see that Bostick´s work provides the necessary extension of [1-3,7] which treats in detail the issue of Generation, going beyond Bostick´s heuristic/phenomenological approach to Particles structure determination.

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Figure 1: The Universe Time-Scale, as freely adapted from [4]. At 4 GeV environment energy, vacuum should be a quite dense structure, allowing fluctuations to give rise to embryo particles.