Is Unmatter a Plausible Dark Matter Candidate?

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Abstract

Current observations reinforce the hypothesis that Dark Matter does not consist of particles resembling in any way the primary constituents of the Standard Model (leptons, quarks, gauge bosons or the Higgs scalar). By default, these findings point to an earlier proposal according to which Dark Matter is an elusive manifestation of "*Unmatter*".

Key words: Dark Matter, Standard Model, Unmatter, Cantor Dust, Primordial Black Holes.

Below is concise list of arguments in favor of "*Unmatter*":

- Several on-going searches continue to report either inconclusive evidence or the absence of WIMP's, sterile neutrinos, axions, neutralinos and other beyond the Standard Model (SM) particles associated with Dark Matter [1-4]
- The SM can be described as a self-contained multifractal set near the electroweak scale, with its gauge and flavor content tightly constrained [5]. No other particles of symmetries appear to exist beyond SM, *at least* in the low TeV regime of energy scales. The maximum number of fermion flavors is likely limited to the six known generations of leptons and quarks [6]. Furthermore, the multifractal structure of the SM provides a straightforward explanation on the ***naturalness*** problem:

a) The Higgs-like scalar represents a *weakly-coupled condensate of gauge bosons*, likely to become unstable not too far from the low TeV scale [5, 13 – 14, 16],

b) A naturally large separation exists between the electroweak scale, the cosmological constant scale and the Planck scale, generated by the low-level fractality of spacetime near or above the electroweak scale [5, 15].

- "*Unmatter*" is an exotic state which drastically deviates from the attributes of baryonic matter. It reflects a continuous spectrum of neutralities between particles and antiparticles and between gauge bosons and fermions. It is likely built from fractional numbers of states and arbitrary mixtures of integer and half-integer spins [7-9].
- Dark Matter emulates the properties of "*Cantor Dust*" and behaves like an extended superfluid phase [10]. This interpretation is attractive for a two-fold reason:

a) It matches current observations of Dark Matter on both cosmological and galactic scales.

b) It is compatible with the hypothesis that Dark Matter arises from the abundance of primordial black holes, as a result of high-density condensation of "*Cantor Dust*" [11-12].

References

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