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Article

The *Dark Sector* in the Baryon Phase Transition Cosmology

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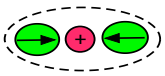
Abstract: This brief communication considers and illustrates *dark matter* and *dark energy* within the Baryon Phase Transition (BPT) cosmological model as well as some experiments that may confirm (or deny) the validity of the model.

Keywords: dark matter; dark energy; Compton composites; tresinos

1. Introduction

In my recent paper [1], the *strangeness* of the Standard Model of Cosmology (SMC) (the ΛCDM cosmology) was contrasted with our baryon phase transition (BPT) cosmology [2,3]. Because the SMC has been examined for many years now without either a *dark matter* particle being detected or a *dark energy* theory having been clearly identified, it is appropriate that the BPT model should be subjected to further examinations to either confirm (or deny) this model. In the present paper, I hope to begin this effort.

In the BPT, the *dark matter* particle is composed two separate but bound pieces: a proton and a *tresino* where the latter is itself a Compton-scale composite particle composed of two electrons and a proton bound together in a balance between electrostatic and spin forces [4]. This composite is *illustrated* below with electrons in green and a proton in red and shows it to have a net negative charge. In order avoid undue repetition, readers should note that details of the physics in this *illustrated* paper will be found in the references to our published papers.



2. *Dark Rotors* are the *Dark Matter* Particles in the BPT Model

Tresinos are generated about 200 years after the “big bang". Figure 1 *illustrates* the *tresino* formation in the early Universe plasma. Note that they are created in pairs along with their recoiling protons.

3. “Free" Tresinos and Protons represent the *Dark Energy* in the BPT Model

After the baryon phase transition takes place, the plasma mostly consists of *tresinos* and protons. But these two components are, of course, attracted to each other so that, in collisions, some are captured as *dark rotors* as illustrated on the LHS of Figure 2. Those pairs that do not form *dark rotors* (see [3]) continue on in expansion as “free" *tresinos* and protons as illustrated in the RHS of Figure 2. These collisions result in about 25% becoming *dark rotors* and about 70% as “free" *tresinos* and protons. Interestingly, the two latter groups expand much faster than the *dark rotors* that expand at the speed at which they were created (at a temperature of ≈ 25eV) in the Hubble flow (see discussion in [1] and [5]). Note that this result also answers a common cosmological question “where have all the baryons gone?".

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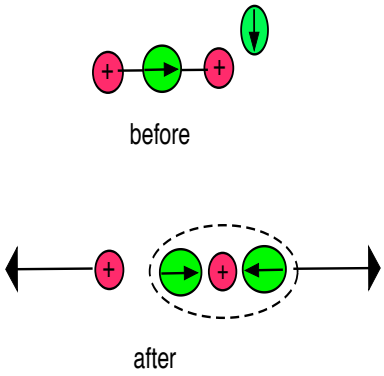

Figure 1. *Illustration* showing *tresino* formation and associated proton recoil.

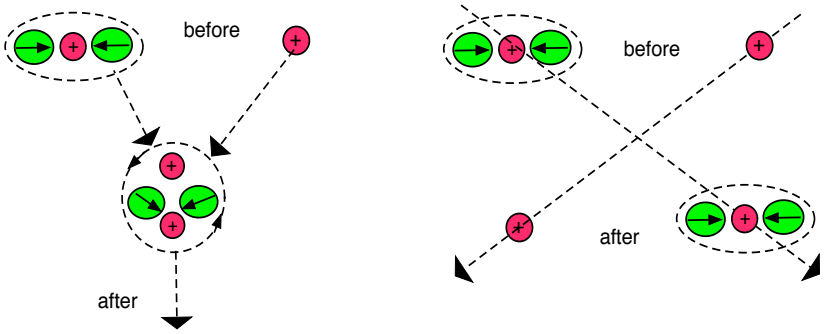

Figure 2. Proton and *tresino* collisions creating either a *dark rotor* (LHS) or a “free" proton and “free" *tresino* (RHS). Dashed circles indicate bound systems.

4. *Dark Rotors* in Experiments

As opposed to the ongoing search for a *dark matter* particle in the SMC, the BPT’s *dark rotors* have been observed for decades in the so-called 2175 Å extinction line, as I have discussed in [3]. Below the extinction “fit" is shown Figure 3 and results in the *dark rotor* density being between 6.7 and 10 cm^{-3} along this path (taken from [3]).

5. *Rotor Direct-Detection* Experiments

I have previously considered such experiments in [5] and determined that they would be quite difficult to field both because of the inherent size of the *rotors* and, more importantly, the difficulty of obtaining a “manageable" source of them. However, I hope that this present review will inspire some clever experimentalists to take-up the challenge.

6. *Dark Energy* Detection

As mentioned above, the *tresinos* and protons (amounting to about 70% of the initial baryons) that escape becoming *dark rotors* expand more rapidly than does the Hubble flow, so they are the first mass to populate the late Universe before the formation of the “last scattering surface" and therefore are not registered in the CMB radiation. These early pairs then represent a charge-neutral background into which the *ordinary* matter and the *dark rotors* eventually form and are observed in the CMB, and then become our later Universe. ([1], [5]).

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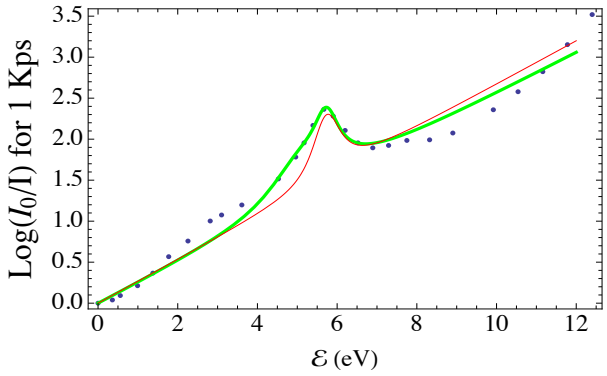

Figure 3. The extinction "fits' obtained from excitations of *dark rotors*.

7. Final Remark

The BPT cosmology is straightforward as this *illustrated* version shows. Whether this model is closer to what actually happened in our Universe, or not, will require (as mentioned) some clever experiments to examine the details of its *dark sector* in future experimental efforts.

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