Baryon Asymmetry, Dark Matter, WIMP and Super Massive Black Holes

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Abstract :
CPT theorem is reinterpreted in the context of commonly observed phenomenon and extrapolated to explain the Baryogenesis in the early Universe that has led to the observed Baryon Asymmetry in the present Universe. Anti-neutron matter is proposed as a suitable candidate for Dark Matter WIMP and Super Massive Black Holes (SMBH) at the Galactic centers.

Introduction:

The discrete transformation CPT is the product of charge conjugation C, parity reflection P, and time reversal T, while the Lorentz transformations include rotations and boosts. These symmetries are connected via the CPT theorem, which under mild assumptions states that CPT is an exact symmetry of local Lorentz-covariant field theories of point particles (Kostelecký, 1998).

Observed Phenomenon:

It is observed that the free neutrons undergo decay with the formula:
$n^0 -> p^+ + e^- + \overline{\nu}_e + \gamma$
The protons are stable and don't undergo any observed mutation.

Conjecture:

Hypothetically if we reverse the parity P, conjugate the charge C and reverse the time, by CPT theorem we should observe that the anti-neutron would undergo a decay in **reverse time** as follows:
$\overline{n}^0 -> \overline{p}^- + \overline{e}^+ + \nu_e + \gamma$
Hence in **normal time**, this decay will not happen. i.e, in normal time the anti-neutron is a stable anit-baryon and anti-proton is the unstable anti-baryon. Any anti-proton formed from gamma rays will absorb energy and decay as:
$\overline{p}^- + \gamma -> \overline{n}^0 + e^- + \overline{\nu}_e$

Indeed if this is the case then there is no CPT violation during Baryogenesis after the Big Bang and the universe was filled with anti-neutrons equal to normal neutrons. The normal neutrons underwent decay to protons and electrons but the anti-neutrons remained unaltered.

This conjecture could also provide candidates for answers to some of the questions like composition of Dark Matter and Super Massive Black Holes at the center of Galaxies.

These anti-neutrons interacted with each other with strong, weak and gravitational forces but not the electromagnetic forces. Since anti-neutrons are stable and didn't repel each other they clumped together to form larger and larger anti-neutron aggregates and these might be the WIMP (Weakly interacting Massive Particles) and SMBH (Super Massive Black Holes) at the Galactic centers around with matter rotates held together by gravitation.

Conclusion:

A simple explanation of Baryon Asymmetry has been provided and provided candidates for explanation of WIMP and SMBH.

Bibliography

Kostelecký, V. A. (1998). "The Status of CPT". *arXiv:hep-ph/9810365* .