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Differentiating normal matter, anti-matter and dark matter

Although this subject has been covered previously in different papers, the latest paper published covers all of the three types of matter together, so that their similarities and differences can be understood better.

The main difference between the current interpretation of the difference between matter and anti-matter is that they have different signs of charge. But specifically what is meant is that the 'normal' particles, that is those occurring predominantly, are matter and that their opposites are anti-matter.

This leads to, for example, the proton and electron being defined as the normal matter particles, despite their being of opposite charge.

What the loop hypothesis does is show that through a greater number of degrees of freedom in defining opposites, the opposite of a positively charged spin + ½ loop is a negatively charged spin + ½ loop.

The result is that, if the positively charged proton and positron are defined to be the matter loops, then the electron is an anti-matter loop.

It also follows that neutral particles, like the neutron and some neutrinos, will be anti-matter particles and their opposites will be matter particles.

This result implies that stable nuclei grow by adding both a matter proton and an anti-matter neutron, so that these nuclei are equal balances of matter and anti-matter.

The same is the case for a photon, composed of a matter lepton loop plus its anti-matter lepton anti-loop, each with the same sign of spin. This is a perfect match of matter and anti-matter.

What this means is that anti-matter is hiding in plain sight and it is only the incorrect definition of what is matter and what is anti-matter that keeps the matter asymmetry question open.

It is also the case that matter and anti-matter do not annihilate on contact, otherwise there would be no nuclei or photons. Matter and anti-matter usually combine, although their combinations will look like annihilation with highly energetic photons resulting.

The paper also considers the ratio of normal plus anti-matter to total matter and the ratio of dark matter to total matter and finds them to be not too different to observation using a new way of counting and creating loops with different numbers of meon and anti-meon pairs comprising those loops.

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