

A disproof of the possibility of antigravity in antimatter

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Abstract:

There has been much discussion, planning, and experimentation concerning the possibility that antimatter may be repelled by the gravity field of matter, and vice versa. This short paper dispels that myth.

Proof:

Antimatter can be converted to matter, and vice versa, using either chiral anomalies or a black hole. Both processes have the ability to violate lepton number and baryon number, and thus allow for the conversion. In the case of chiral anomaly, one can induce a reaction that creates a neutrino or anti-neutrino to violate conservation of lepton or baryon number. In the case of the black hole, one can drop matter into it and wait for some antimatter to be emitted in the form of Hawking radiation.

Now consider the following thought experiment.

A machine capable of converting a small amount of matter into antimatter is lowered some distance in a gravity field, the conversion between matter and antimatter is done, and then the machine is raised the same distance it was lowered.

If the matter weighs differently from the antimatter, then the weight of the machine changed after it was lowered and before it was raised. This means energy was either created or destroyed.

So for antimatter to exhibit antigravity, energy conservation must be violated.