Neutrino-less Double Beta Decay violates Angular Momentum Conservation

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Abstract: Neutrino-less, Double Beta Decay, will violate Angular Momentum Conservation.

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Neutrino-less Double Beta Decay

In the April 2014, American Physical Society Meeting in Savannah Georgia, there were at least two reports that assumed the possibility of Neutrino-less Double Beta Decay:

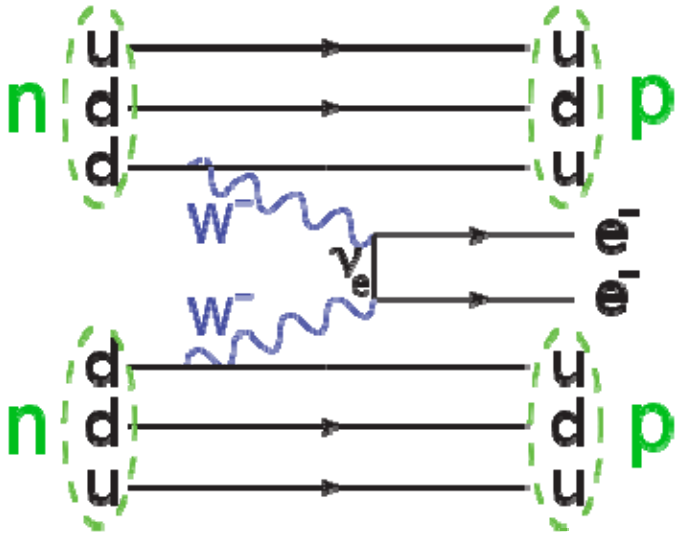
in [Bulletin-1], they state

> "*Cryogenic liquid Xenon detectors have become a popular technology in the search for rare events, such as dark matter interaction, and Neutrino-less Double Beta Decay*."

in [Bulletin-2], they state

> "*The XEO collaboration is currently searching for Neutrino-less Double Beta Decay using the scintillation and ionization response of a liquid Xenon Time Projection Chamber."*

By [Wikipedia], in Double Beta Decay, two neutrons in the same nucleus transition to protons, and two electrons and two electron antineutrinos are emitted.



The above Diagram from [Wikipedia], does not describe the geometry involved, and does not account for the momentum conservation

Based on the above, the Wikipedia reports the following:

- The Neutrinos in Double Beta Decay may be virtual, and the process will be Neutrino-less
- the two electrons are emitted back-to-back to conserve momentum.
- the two neutrinos annihilate each other, as one nucleon absorbs the neutrino emitted by the other nucleon

We will show these claims to be geometrically, and physically impossible.

1.

The Neutrinos in Double Beta Decay are Never Virtual

In beta decay, a nucleon transitions from its neutron energy level into its proton energy level.

Then, the electron carries away a negative charge, so that the charge in the interaction is conserved. The Neutrino is uncharged because there is no need for another charged particle.

Since the electron has mass, it has energy, and it carries some energy. But it cannot carry all the energy, because that will leave the interaction's angular momentum unbalanced.

The imbalance in energy that led to proposing the neutrino is not the only reason for the need for the neutrino in beta decay.

As important reason for the neutrino is to balance the angular momentum in the interaction.

Assuming that the Proton and Neutron spin directions are identical, the right-handed anti-neutrino is balanced by an

electron with the opposite helicity going in the opposite direction. The interaction still violates parity due to the different overall decay rate with handedness, but angular momentum is conserved.

Then, the neutrino's mass and speed are determined by the conservation of angular momentum and energy.

Had the electron carried away all the energy, there will be no energy left for the neutrino, there will be no neutrino, and the angular momentum in the interaction will remain unbalanced.

A virtual Neutrino will have virtual angular momentum, that will be balanced by a virtual angular momentum of a virtual electron. Namely,

a virtual Neutrino mandates a virtual electron

Since a double beta decay is not electrons-less, it cannot be neutrino-less either.

2.

The Two Electrons are Never Emitted Back-to-Back

It is the electron and the neutrino that are emitted back-to-back to conserve linear momentum.

The Neutrino is needed to conserve angular momentum. And once there is a Neutrino, linear momentum is balanced between that neutrino and its electron.

Furthermore, the Geometry of two electrons emitted back-to-back is impossible: Not only are the beta emissions synchronous, but they are required to be in exact opposite directions out of infinitely many directions in 3-space. And all that to allow the ignorance of the conservation of angular momentum.

Even in statistical terms, the likelihood of such events, as measured by the half lifetime of such interaction, may exceed many times the age of the universe

3.

The Two Neutrinos Do Not Annihilate Each Other

The suggestion that one nucleon may absorb the neutrino emitted by the other nucleon, is unknown to us.

We are unaware of the capture of a neutrino by a nucleon. Weak interactions are understood as processes that may release neutrinos, and not capture them.

Had a neutron absorbed the neutrino emitted by the other neutron, we would expect the neutrino to be emitted from the second neutron.

The neutrino, like the photon, is uncharged, and does not annihilate other neutrinos, anymore than a photon would annihilate another photon.

Neutrino are distinguished by their helicity, but they have no charge. Therefore, the insinuation that two neutrinos may annihilate each other like matter and antimatter do, is rooted in fiction.

Since the Neutrino is needed to balance Angular Momentum in beta decay, Neutrino-less, Double Beta Decay, will violate Angular Momentum Conservation.

Consequently, Neutrino-less Double Beta Decay is impossible Physics.

References

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