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Positron generation and transmutation of high-Z targets by high-intensity lasers

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It has been theorized that, at the Universe's inception, there were equal amounts of matter and antimatter. One of the great mysteries of modern physics is the asymmetry between the amount of matter and the amount of antimatter apparent in the Universe. Here it is shown that, when a high-energy laser strikes a gold target, the gold is transmutated to platinum. This experimental result indicates that hadrons are actually composite particles containing both matter and antimatter. The implications of this new model of hadron structure are significant, impacting our understanding of cosmology, proton-proton chain reactions in stars, the expansion of the Universe, and beta decay in radioactive isotopes, among other key topics in physics.

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1. Introduction

Recent high-energy laser experiments have demonstrated that large quantities of positrons and electrons may be generated when a high-energy laser strikes a gold target, and these paired particles can be easily separated magnetically. Based on this surprising experimental observation, it was hypothesized that a composite hadron model containing both matter and antimatter can result in ordinary, observed matter. Denominated the Composite Hadron Model, this model was motivated by the contrast between the theory of gross matter/antimatter symmetry in the Universe and our observation of apparent matter/antimatter asymmetry, in conjunction with the recognized *subatomic* asymmetry of matter and antimatter. The Composite Hadron Model predicts that transmutation of targets in high-energy laser experiments will take place. In experiments conducted at the Texas Petawatt Laser Facility by Dr. Alexander Henderson, it has been shown that gold is transmutated to platinum when positrons and electrons are ejected from a gold target stuck by a high-energy laser. These experimental results indicate that the Composite Hadron Model is accurate.

1.1 Observation – paired-particle generation by high-intensity laser

In 2008-09, Hui Chen and others on her team at Lawrence Livermore National Laboratory, along with others from Rice University and the University of Rochester, demonstrated that large quantities of electron/positron pairs are generated, and can be separated magnetically, when a high-energy laser strikes a gold target.[1]

It was understood, in agreement with Bethe & Heitler's theoretical understanding, that the positrons generated in these high-energy laser experiments arise from the quantum vacuum. Of great significance is the fact that Chen and her team were able to easily magnetically separate the electron/positron pairs generated by her laser. Under current theory, virtual particles that arise from the quantum vacuum cannot be easily separated.

1.2 Hypothesis – Composite Hadron Model

Because the electron/positron pairs in Chen's experiments were easily separable, the assumption that the positrons generated in high-intensity laser experiments arise from the quantum vacuum was questioned. Rather than arising from the quantum vacuum, it was hypothesized that the positrons generated when petawatt lasers strike gold targets are *pre-existing* within the gold targets.[2] Assuming that positrons have already existed within the gold target's nuclei, it was theorized that quark *and antiquark* triads can pair with positrons to form neutrons and protons as we currently understand them. To test this hypothesis, it was proposed that high-Z targets be assayed after irradiation by high-intensity lasers to determine whether transmutation takes place. If so, the matter/antimatter hadron structure of the hypothesis would be indicated.

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1.3 Experiment – transmutation of gold to platinum by high-energy laser

The transmutation of gold to platinum when a high-energy laser strikes a gold target was demonstrated in 2015 by Alexander Henderson of Rice University, working at the Texas Petawatt Laser Facility (located at the University of Texas in Austin, Texas).[3] As part of his doctoral research into electron/positron pair production when a petawatt laser strikes various targets, Dr. Henderson observed the transmutation of gold to platinum. He described this observation in his doctoral dissertation. In summary, a high-intensity laser was used to strike various targets, including gold targets. Production of positrons and electrons was detected. After irradiation by the laser, the gold targets were analyzed spectroscopically, and platinum was detected in the targets.

1.4 Conclusion from Henderson's experimental results

Dr. Henderson's observation of transmutation indicates that the Composite Hadron Model is correct. The Composite Hadron Model correctly predicted that high-intensity lasers generating positrons from a high-atomic-mass target will transmutate the target. Under the Standard Model, in contrast, the electron-positron pairs generated in high-energy laser experiments should arise as virtual particles from the quantum vacuum and should not transmutate the targets. Further evaluation of the Composite Hadron Model is called for.

2. Consistency with significant astrophysical and experimental observations

The Composite Hadron Model is consistent with key astrophysical and experimental observations, many of which are currently unexplained by the Standard Model:

- The theoretical prediction of gross matter/antimatter symmetry in the Universe
- The observed apparent gross matter/antimatter asymmetry in the Universe
- Matter/antimatter asymmetry at the subatomic scale
- The presence of antimatter, such as pion matter/antimatter pairs, in collider experiments (as shown by Lattes, Occhialini, Powell, and others)
- The observed basic hydrogen/helium ratios in stars
- Proton-proton chain reactions in stars
- The expansion of the Universe and the increasing rate of expansion of the Universe
- The observed 511-keV signature of the Milky Way
- The slower-than-expected rate of rotation of galaxies due to Dark Matter
- Beta decay, both β- and β+, as well as electron capture in beta decay
- Radioactive decay as a second-order kinetic
- The extended life of the power generator of the Voyager spacecraft as it has traveled away from the Sun

3. Conclusion

The implications of the Composite Hadron Model, if accepted by the physics community, are profound. Our understanding of the formation of the Universe, its evolution, and its eventual demise/rebirth are likely to be impacted by the basic matter/antimatter composite hadron structure of this model. Key topics in physics, including proton-proton chain reactions in stars, hadron formation and structure, beta decay, the Cosmological Constant, Dark Energy, and Dark Matter, are implicated by the Composite Hadron Model.

The subject of this talk has been published in "Composite matter/antimatter hadron structure indicated experimentally at the Texas Petawatt Laser Facility," *Phys. Ess*. 37(4): 270 (Dec 2024), which provides greater detail regarding the implications of, and the observational and experimental support for, the Composite Hadron Model.

References

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