physics central
physics buzz blog
physics fun and science news.
socks optional.

Friday, July 22, 2016

Experimental Results Hint at Fifth Fundamental Force

Last week, we reported on a new theory by Dr. Jonathan Feng and collaborators, slated to appear in *Physical Review Letters*, which postulated a fifth fundamental force of nature. Exciting as this work is, our piece contained some errors and gave altogether the wrong impression, suggesting that the experimental work that served as the basis for this new theory might not be reliable. PhysicsCentral would like to apologize to our readers for this miscommunication, and in particular to Dr. Feng, as well as to the Atomki research group whose discovery of unusual features in the decay of Beryllium-8 atoms laid the groundwork for the new theory.

The Atomki group's research, also published in *Physical Review Letters* several months prior, reported the occasional observation of an unusually high degree of separation between particles of matter and antimatter created by the decay of Beryllium-8. This finding is at odds with the traditional picture of Beryllium-8 decay—something like 99.9% of the time, the electron and its antimatter counterpart, a positron, are picked up very close to one another. The other one time in a thousand or so, however, the spread is much greater, suggesting that dynamics beyond the Standard Model may be at play.

Now, UC Irvine physicist Dr. Jonathan Feng and his co-authors Bart Fornal, Iftah Galon, Susan Gardner, Jordan Smolinksy, Tim Tait, and Philip Tanedo may have the explanation: a new, as-yet-undiscovered particle, tentatively named the X boson. The X boson would act as an intermediate particle, carrying away excess energy resulting from Beryllium-8's decay before turning into a positron/electron pair—a job ordinarily performed by high-energy photons. The X boson, having mass and therefore moving much more slowly than the photon, could account for the unusual positron/electron spread.

This hypothetical new particle would have some unusual properties, and has caused something of a stir in the physics community as a result—in order to properly explain the Atomki group's results, the X boson would interact exclusively with the neutrons in an atom's nucleus. This never-before-seen property is being called *protophobia*, denoting the particle's apparent tendency to avoid protons in favor of the equally massive but electrically-neutral neutrons.

The reason this proposition has sparked so much discussion is that no combination of the four known fundamental forces of nature—gravity, electromagnetism, and the nuclear strong & weak forces—produces this property of protophobia. If Dr. Feng's theory is correct, it would mean that there are other, as-yet-undiscovered forces playing a role in the decay of Beryllium-8. Should this prove true, it would have enormous implications for future theories and experiments, potentially providing tools to study phenomena that have thus far proven elusive, such as dark matter.

Experiments that should either affirm or refute the possibility of a protophobic X boson are already underway, so keep an eye out for further news on developments in this story—we'll keep you posted here at PhysicsCentral.

Posted by Positron at 7/22/2016 02:18:00 PM

Labels: antimatter, dark matter, matter, Protophobic, X boson

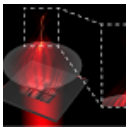
No comments:

Post a Comment

Visit PhysicsCentral.com

Follow Physics Central

Popular on Physics Buzz This Week

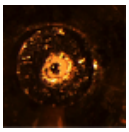


Winding Light Takes New Paths

Light travels in a straight line. If that ceased to be the case, reflections, shadows, and really the whole world would make a lot less sens...

Experimental Results Hint at Fifth Fundamental Force

Last week, we reported on a new theory by Dr. Jonathan Feng and collaborators, slated to appear in Physical Review Letters , which postulate...



Diamonds Lead to Ultra-High Pressure Situations

Trying to find the perfect diamond has always been stressful, especially in a high-pressure environment. However, recent experimental result...

The Science of Ice Cream

Even though it's been a warm couple of months already, it's officially summer. A delicious, science-filled way to beat the heat? Mak...