Has PAMELA Already Seen Dark Matter?

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PAMELA is launched onboard a Resurs-DK1 Russian satellite by a Soyuz rocket in June 2006.

(PhysOrg.com) -- Back in 2006, PAMELA (a Payload for Antimatter Matter Exploration and Light-nuclei Astrophysics) was launched with the purpose of detecting cosmic radiation and looking for clues pointing to dark matter. And now it's possible that PAMELA might have already spotted dark matter.

Earlier this year, PAMELA sent data about high energy positrons -- a higher presence of them than originally expected. Speculation is that these positrons might have been generated by annihilations. Annihilations are collisions between dark matter particles that result in high amounts of energy.

Philipp Mertsch, a researcher at Oxford University in England, is

working on figuring out how to detect dark matter, using information from PAMELA. He was interviewed by the Oxford Science Blog about dark matter, and how to test if these positrons represent the results of dark matter:

If dark matter is made of new elementary particles (and antiparticles) created in the Big Bang then these will occasionally annihilate with each other in the dense environ of our Galaxy. Most of the energy released like this goes into neutrinos or gamma-rays but a small fraction is released as energetic positrons into the cosmic radiation.

Subir Sarkar, who is also working on this project, goes on to point out that one of the problems is distinguishing between positrons and protons. The team at Oxford has devised a test to determine the source of the protons, and Sarkar offers this on the Oxford Science Blog:

Measuring the ratio of the flux of boron nuclei compared to carbon nuclei can therefore discriminate between the dark matter and pulsar source models on the one hand and the nearby cosmic ray accelerator model on the other hand.

While this ratio is being measured right now, there is a larger experiment slated to run next year, so the test can be better carried out. It will be interesting to see what comes back. Dark matter is of great interest to astrophysicists who contend that most matter in the universe is actually dark matter. Additionally, the presence of dark matter, and knowing what it is composed of, could answer questions about how our universe came into being -- and how it is evolving.