

Scientific gumshoes find possible clues on dark matter but haven't cracked the case yet



Video: A cosmic ray detector on the International Space Station has found the footprint of something that could be dark matter, the mysterious substance that's never been directly observed but is believed to hold the cosmos together.

By Associated Press, Updated: Wednesday, April 3, 6:33 PM

GENEVA — It is one of the cosmos' most mysterious unsolved cases: dark matter. It is supposedly what holds the universe together. We can't see it, but scientists are pretty sure it's out there.

Led by a dogged, Nobel Prize-winning gumshoe who has spent 18 years on the case, scientists put a \$2 billion detector aboard the International Space Station to try to track down the stuff. And after two years, the first evidence came in Wednesday: tantalizing cosmic footprints that seem to have been left by dark matter.

But the evidence isn't enough to declare the case closed. The footprints could have come from another, more conventional suspect: a pulsar, or a rotating, radiation-emitting star.

The Sam Spade in the investigation, physicist and Nobel laureate Sam Ting of the Massachusetts Institute of Technology, said he expects a more definitive answer in a matter of months. He confidently promised: “There is no question we’re going to solve this problem.”

“It’s a tantalizing hint,” said California Institute of Technology physicist Sean Carroll, who was not part of the team. “It’s a sign of something.” But he can’t quite say what that something is. It doesn’t eliminate the other suspect, pulsars, he added.

The results from the Alpha Magnetic Spectrometer, or AMS, are significant because dark matter is thought to make up about a quarter of all the matter in the universe.

“We live in a sea of dark matter,” said Michael Salamon, who runs the AMS program for the U.S. Energy Department. Unraveling the mystery of dark matter could help scientists better understand the composition of our universe and, more particularly, what holds galaxies together.

Ting announced the findings in Geneva at the European Organization for Nuclear Research, the particle physics laboratory known as CERN.

The 7-ton detector with a 3-foot magnet ring at its core was sent into space in 2011 in a shuttle mission commanded by astronaut Mark Kelly while his wife, then-Rep. Gabrielle Giffords, was recovering from a gunshot wound to the head. The device is transmitting its data to CERN, where it is being analyzed.

For 80 years scientists have theorized the existence of dark matter but have never actually observed it directly. They have looked for it in accelerators that smash particles together at high speed. No luck. They’ve looked deep underground with special detectors. Again no luck.

Then there’s a third way: looking in space for the results of rare dark matter collisions. If particles of dark matter crash and annihilate each other, they should leave a footprint of positrons — the anti-matter version of electrons — at high energy levels. That’s what Ting and AMS are looking for.

They found some. But they could also be signs of pulsars, Ting and others concede. What’s key is the curve of the plot of those positrons. If the curve is one shape, it points to dark matter. If it’s another, it points to pulsars. Ting said they should know the curve — and the suspect — soon.

The instrument will be measuring cosmic rays, where the footprints are found, until 2020 or so.

Other scientists praised the results and looked forward to more.

“This is an 80-year-old detective story and we are getting close to the end,” said University of Chicago physicist Michael Turner, one of the giants in the field of dark matter. “This is a tantalizing clue and further results from AMS could finish the story.”

Borenstein reported from Washington.

http://www.washingtonpost.com/business/scientists-in-geneva-find-hint-of-dark-matter-in-universe-from-2-billion-cosmic-ray-detector/2013/04/03/bcfcb60-9c6f-11e2-9219-51eb8387e8f1_story.html