Spacewalk excursion to extend the life of a powerful spectrometer

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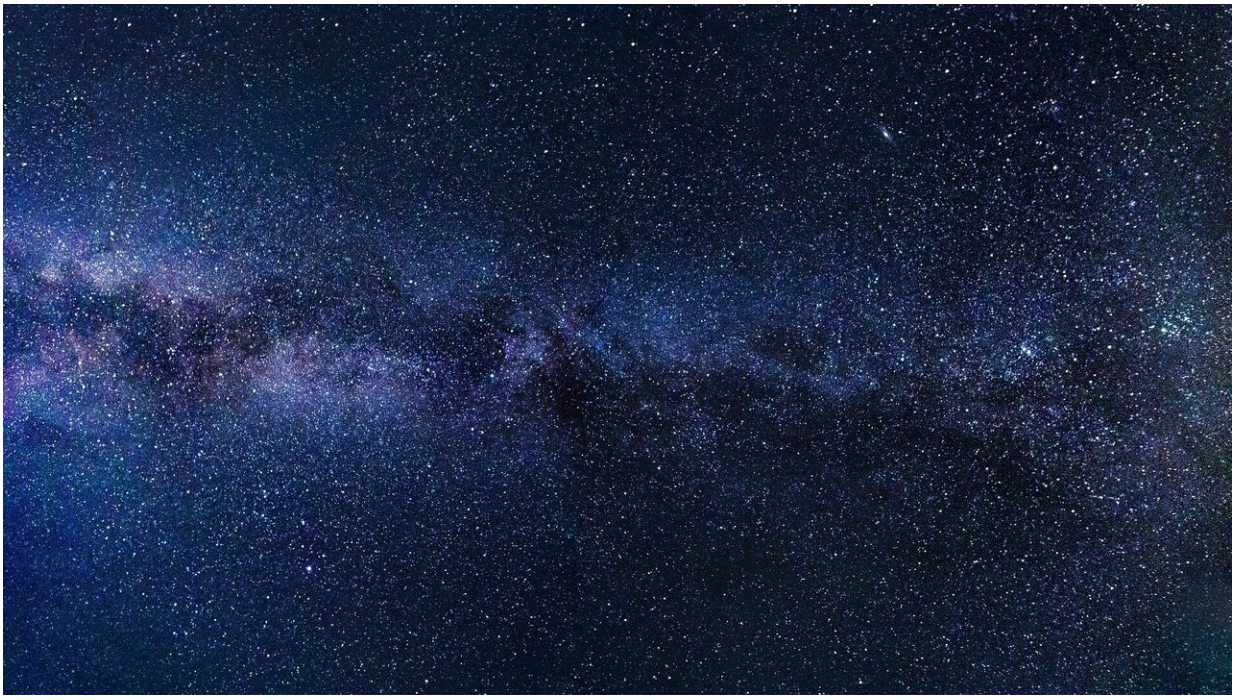

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One of the largest human-made permanent magnets in space resides on the International Space Station (ISS), and it's helping scientists better understand the origins of our universe. The Alpha Magnetic Spectrometer (AMS-02) is an observatory that is collecting data from measurements of cosmic rays, nuclei from hydrogen up to iron, as well as electrons and positrons that pervade all of our universe.

The original AMS was launched on the Space Shuttle in 1998 to test the concept of using a powerful magnet to conduct in-depth studies of sub atomic particles coming from millions of light years from the Milky Way. AMS-02 was installed on the space station in 2011, with a projected lifespan of three years. Eight years later, it's still working, having already measured and categorized almost 140 billion cosmic rays.

Studying these particles can help researchers understand their origin in ways not possible on Earth, whose atmosphere affects them. Data has been captured from sources of positrons at high energies that could be evidence of dark matter, an invisible form of matter that makes up most of the mass content of the universe. More data is needed before scientists can better explain these results. This space-based observatory is essential to helping scientists answer many fundamental physics questions.

But, with AMS-02 now five years beyond the lifetime it was designed for, will it last long enough to give scientists the information they seek? Dr. Kirt Costello, the ISS Program Chief Scientist at Johnson Space Center says, "That's why astronauts are conducting a series of spacewalks, known as extravehicular activities (EVAs), in the Fall of 2019."

AMS-02 uses four cooling systems that circulate liquid CO_2. Three of those systems have failed. As Dr. Costello notes: "The EVA team here at Johnson has partnered with the AMS team to design equipment and tools that will allow us to safely replace those cooling pumps. If everything goes according to plan, we think we can extend the life of AMS-02 to deliver full-time science operations for the lifetime of the station."

Additional time for data gathering and refinement will allow scientists to continue learning more about the origins of the universe.

More information: For more on scientific studies being done on and from the space station, go to www.nasa.gov/iss-science

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Provided by NASA