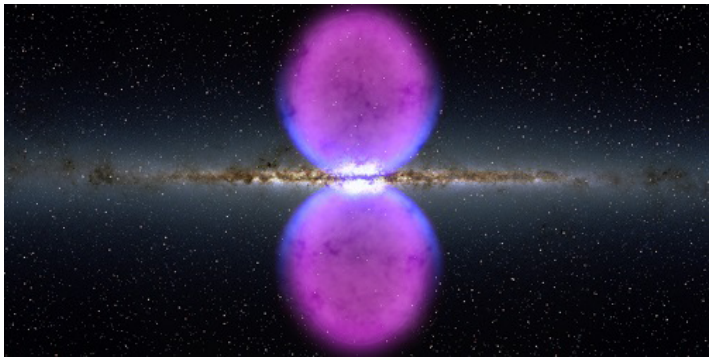
Sagittarius Galaxy Found Not Guilty

A new analysis challenges the claim that a gamma-ray signal observed from a direction near the Milky Way's center is produced by a dwarf galaxy.

By **Ryan Wilkinson**

The Fermi bubbles are vast regions of gas and cosmic rays that extend above and below the plane of our Galaxy from its center. The southern bubble contains a peculiar region dubbed the cocoon, which emits more gamma rays than the bubble around it. In 2022, scientists proposed that the excess emission originates from one of the Milky Way's closest and most massive satellite galaxies, the Sagittarius dwarf spheroidal galaxy. Now Christopher Eckner at the University of Nova Gorica, Slovenia, and his colleagues have performed a data analysis that strongly disfavors this hypothesis [**1**]. The team's findings suggest that the cocoon's gamma-ray signal is consistent with emission seen at other parts of the Fermi bubbles.

The scientists who published the 2022 work identified a spatial overlap between the cocoon and the core of the Sagittarius dwarf spheroidal galaxy [**2**]. By examining data taken by NASA's Fermi satellite, they concluded that the cocoon's gamma-ray signal comes directly from this core. The scientists then attributed the signal to the combined gamma-ray emission of a speculative population of rapidly spinning neutron stars called millisecond pulsars in the galaxy's core.



Credit: NASA/Goddard Space Flight Center

To assess those claims, Eckner and his colleagues conducted a detailed reanalysis of the Fermi data. They used a combination of data-driven background-optimization techniques and photon-count statistical methods. This analysis was backed up by dedicated numerical simulations. The researchers concluded that the cocoon's apparent excess of gamma-ray emission is probably caused by statistical fluctuations in the Fermi bubbles. The need to invoke the Sagittarius galaxy and its putative pulsar population is unnecessary, they say.

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REFERENCES

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2. R. M. Crocker *et al.*, "Gamma-ray emission from the Sagittarius dwarf spheroidal galaxy due to millisecond pulsars," **Nat. Astron. 6, 1317 (2022).**