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# NASA's New Horizons Surprises With Whole New View Of Cosmos

As the authors note, New Horizons' serendipitous observations include emission from known astrophysical processes in galaxies --- including stellar nucleosynthesis; mass accretion onto black holes; and the gravitational collapse of stars.

Getting out beyond our solar system's zodiacal light is the key to making such observations.

Simply put, zodiacal light is a diffuse cone of light in the plane of the sky that is most visible from Earth in the East just before sunrise; and in the West just after sunset. In our own solar system, astronomers think it's mostly caused by the reflection of sunlight from tiny particles of dust leftover from collisions in our Main Asteroid Belt.

"The sunlight scattered off dust in the solar system is some 100 times brighter than the signal we're trying to measure," said Zemcov. "In the outer solar system, that component completely disappears, and your biggest problem actually becomes the diffuse light scattered from dust in our galaxy."

But once past the orbit of Jupiter, most of this cosmic dust disappears and the solar system's sky gets increasingly darker. Thus, for the past decade there's been discussion of actually launching dedicated optical telescopes to cruise out beyond Jupiter to get a darker and more unobstructed view of our galaxy and beyond.

Prior to cruising well beyond Pluto, NASA's New Horizons spacecraft used an onboard imaging telescope to make the best-ever observations of the universe's cosmic optical background (COB). That is, the sum of the universe's emitted optical light from beyond our own Milky Way galaxy.

In a paper in the journal *Nature Communications*, the authors detail how they used the spacecraft's archival data acquired during its cruise phase to make the cleanest-ever observations of this extragalactic light. The data was acquired at wavelengths roughly visible to the human eye with the spacecraft's Long Range Reconnaissance 20.8-centimeter Imager.

"There have been several measurements of the COB over the years, many in fairly violent disagreement with one another," Michael Zemcov, an astrophysicist at the Rochester Institute of Technology in New York state, and the paper's lead author, told me. "This one is the cleanest yet in the sense that we don't have to deal with the bright light reflected from dust in the inner solar system."

Zemcov says his team is continuing to use this archival data to determine whether there is an optical light component that isn't explained by the galaxies they have measured. He says that might be stars flung from their galaxies; decaying dark matter particles; or even very faint, small galaxies that can't be easily measured with current techniques.

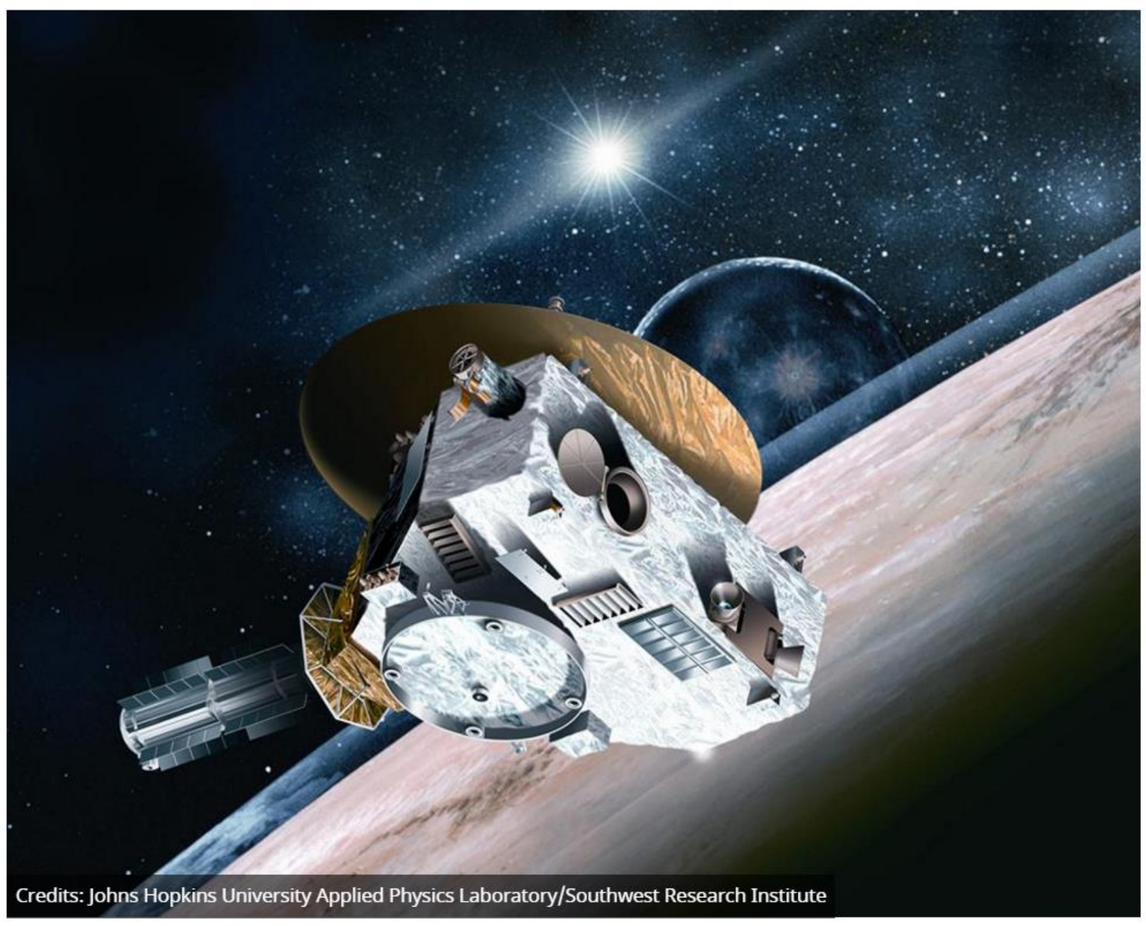
What's most surprising about any of this?

That New Horizons was able to look at some relatively empty patches of sky that let us disentangle the background from the more local emission, Zemcov says. He notes these are some of the first astrophysical measurements to come from an instrument beyond the orbit of Saturn.

In addition to observing the COB, Zemcov says that observations from the outer solar system can also help astronomers make better distance measurements to distant stars and galaxies; as well as look for exoplanets and distant supernovae.

"This is one of the first astrophysical measurements to come from an instrument beyond the orbit of Saturn," said Zemcov. He says once the New Horizons spacecraft completes its Kuiper belt mission in 2021, ideally, its imager would be used for dedicated astrophysics observations.

Zemcov says that's an issue already being discussed with NASA.




*Artist conception of New Horizons Spacecraft.*