Dr. Giulio Mazzolo
Website: giuliomazzolo.com

I have written this news story as part of the final assignment of the online and media writing module offered by the University of the West of England (UWE Bristol, UK). The module was taught across 10 weeks of online content between April and July 2022. The news story reports on an astronomical discovery, with the study accepted for publication on The Astrophysical Journal. It is intended for online newspapers with a science section. The targeted audience are readers (mainly adults, 30 – 50 years of age) who do not necessarily have an academic background in science, nor any particular knowledge or interest in astronomy. To write the story, I have contacted Kailash Sahu, astronomer at the Space Telescope Science Institute in Baltimore (USA) and lead author of the study, who kindly provided the original quotes in the article.

Astronomers find the first isolated black hole ever observed

For the first time, scientists have been able to discover a black hole roaming our Milky Way galaxy without any cosmic objects around. This result is a crucial step towards uncovering the vast majority of black holes in the galaxy and unlocking the secrets of these fascinating yet mysterious bodies.

Black holes are probably the most puzzling objects in the Universe. But now, the discovery of a lone black hole lurking in the depths of space — about seven times as massive as the Sun and located approximately 5,000 lightyears away in our Milky Way galaxy — promises to shed new light on their elusive nature.

"*To understand black holes, it is necessary to find black holes which are isolated, so that their evolution is unaffected by a close companion,*" says Kailash Sahu, astronomer at the Space Telescope Science Institute in Baltimore (USA) and lead author of the study reporting the discovery, recently accepted for publication in *The Astrophysical Journal*.

"*There should be a lot of black holes in our Galaxy, about 100 million,*" explains Sahu. "*The vast majority of them should be isolated black holes without any companion. Yet not a single isolated black hole was ever discovered, because they do not emit any light.*"

In fact, all black holes known to date had been discovered thanks to their interaction with close-by objects. More precisely, by capturing the strong radiation coming from stars or gas being swallowed by a black hole, or the so-called gravitational waves, emitted when black holes collide with each other or with exotic stars known as neutron stars.

But to find an isolated black hole, Sahu and his collaborators had to rely on a totally different strategy — and on the superb sharpness of Hubble, the European Space Agency (ESA) and NASA's space telescope orbiting the Earth at about 570 km from the ground. "*Black holes have a strong gravitational field, so they can bend the light from a background star lined up right behind them,*" explains Sahu. "*This bending of light shifts the position of the background star by a very small amount, which can be observed by the Hubble Space Telescope.*"

This is precisely how the team spotted the black hole in question. However, the feat was no walk in the park, as the shift of the position of the star, which unveiled the black hole's presence, was very small indeed. "*To give an analogy: if you are in New York, then the size of a US quarter situated 3,000 miles away in Los Angeles corresponds to the observed shift of the star's position in the sky,*" says Sahu.

The result of Sahu and his team is backed by a similar study, led by Casey Lam of the University of California (USA) and also suggesting that the discovered object could be a black hole — without excluding, however, that it could be a neutron star instead.

Regardless, the two teams have proven the feasibility of a new method to spot isolated cosmic objects which would otherwise be invisible. And to dig deeper into their baffling nature and secrets.