Hubble Finds Strong Evidence for Intermediate-Mass Black Hole in Omega Centauri

Most known black holes are either extremely massive, like the supermassive black holes that lie at the cores of large galaxies, or relatively lightweight, with masses under 100 times that of the Sun. Intermediate-mass black holes (IMBHs) are scarce, however, and are considered rare "missing links" in black hole evolution.

Now, an international team of astronomers has used more than 500 images from NASA's Hubble Space Telescope — spanning two decades of observations — to search for evidence of an intermediate-mass black hole by following the motion of seven fast-moving stars in the innermost region of the globular star cluster Omega Centauri.

These stars provide new compelling evidence for the presence of the gravitational pull from an intermediate-mass black hole tugging on them. Only a few other IMBH candidates have been found to date.

The astronomers created an enormous catalog for the motions of these stars, measuring the velocities for 1.4 million stars gleaned from Hubble images of the cluster. Most of these observations were intended to calibrate Hubble's instruments rather than for scientific use, but they turned out to be an ideal database for the team's research efforts.

Omega Centauri is about 10 times as massive as other big globular clusters — almost as massive as a small galaxy — and consists of roughly 10 million stars that are gravitationally bound. Credit: ESA/Hubble, NASA, Maximilian Häberle (MPIA)

Paper: https://www.nature.com/articles/s41586-024-07511-z
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