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NEWS

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Evidence Mounts for Mysterious New Class of Black Holes

Astronomers have found further evidence for the existence of what you might call the Goldilocks category of black holes--not too large, not too small, but intermediate in mass. They have also discovered that these elusive objects may be stranger than anyone had imagined.

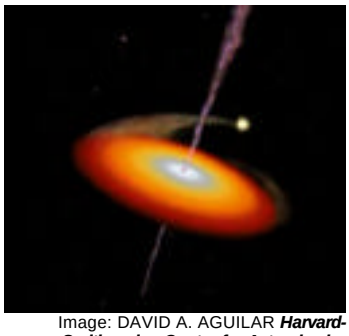

Image: DAVID A. AGUILAR ***Harvard-Smithsonian Center for Astrophysics***

Not long ago, all of the black holes known to science fell into one of two classes: the diminutive stellar variety (with a mass of up to 10 suns) and the supermassive kind (with a mass of millions to billions of suns). But in recent years, hints of midsize black holes--ones containing the mass of hundreds to tens of thousands of suns--have emerged.

In the new work, Jon Miller of the Harvard-Smithsonian Center for Astrophysics and his colleagues used the European Space Agency's XMM-Newton satellite to observe two suspected intermediate-mass black holes in the spiral galaxy NGC 1313, located some 10 million light-years from Earth. They determined that the temperatures of these two objects accord with what would be predicted for black holes of between 100 and 500 solar masses.

Stellar black holes arise from the collapse of massive stars. Supermassive black holes, on the other hand, are thought to form from enormous gas clouds. Exactly how midsize holes are born, however, remains in question. "Three basic scenarios have been suggested," comments team member Cole Miller of the University of Maryland. "Direct collisions and mergers of stars within globular clusters; the collapse of extremely massive stars that may have existed in the early universe; or the merger of smaller black holes. Each scenario has

strengths and limitations." The team's findings were presented earlier this week at a meeting of the High Energy Astrophysics Division of the American Astronomical Society in Quebec, Canada.

Meanwhile, at the same meeting, another group of researchers presented the results of a study of a black hole from galaxy M82. Telltale features of the object's x-ray fingerprint point to it being a middleweight black hole. But the investigators found that the object's accretion disk--the pancake of gas that orbits a black hole--is much hotter than expected for a hole of that size. "Something new and exotic may be taking place in this object to heat the accretion disk to such high temperatures," remarks Tod Strohmayer of NASA's Goddard Space Flight Center. "The nature of these objects is one of the most interesting conundrums of high-energy astrophysics."

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