



This composite NASA image of the spiral galaxy M81, located about 12 million light years away, includes X-ray data from the Chandra X-ray Observatory (blue), optical data from the Hubble Space Telescope (green), infrared data from the Spitzer Space Telescope (pink) and ultraviolet data from GALEX (purple). The inset shows a close-up of the Chandra image. At the center of M81 is a supermassive black hole that is about 70 million times more massive than the Sun.

A new study using data from Chandra and ground-based telescopes, combined with detailed theoretical models, shows that the supermassive black hole in M81 feeds just like stellar mass black holes, with masses of only about ten times that of the Sun. This discovery supports the implication of Einstein's relativity theory that black holes of all sizes have similar properties, and will be useful for predicting the properties of a conjectured new class of black holes.

In addition to Chandra, three radio arrays (the Giant Meterwave Radio Telescope, the Very Large Array and the Very Long Baseline Array), two millimeter telescopes (the Plateau de Bure Interferometer and the Submillimeter Array), and Lick Observatory in the optical were used to monitor M81. These observations were made simultaneously to ensure that brightness variations because of changes in feeding rates did not confuse the results. Chandra is the only X-ray satellite able to isolate the faint X-rays of the black hole from the emission of the rest of the galaxy.

The supermassive black hole in M81 generates energy and radiation as it pulls gas in the central region of the galaxy inwards at high speed. Therefore, the model that Markoff and her colleagues used to study the black holes includes a faint disk of material spinning around the black hole. This structure would mainly produce X-rays and optical light. A region of hot gas around the black hole would be seen largely in ultraviolet and X-ray light. A large contribution to both the radio and X-ray light comes from jets generated by the black hole. Multiwavelength data is needed to disentangle these overlapping sources of light.

Fast Facts for M81:

Credit	X-ray: NASA/CXC/Wisconsin/D.Pooley & CfA/A.Zezas; Optical: NASA/ESA/CfA/A.Zezas; UV: NASA/JPL-Caltech/CfA/J.Huchra et al.; IR: NASA/JPL-Caltech/CfA
Release Date	June 18, 2008
Scale	Full field image is 3 arcmin across.
Category	Normal Galaxies & Starburst Galaxies, Black Holes
Coordinates (J2000)	RA Dec
Constellation	Ursa Major
Observation Date	05/26/05 - 07/06/05
Observation Time	46 hours
Obs. ID	5935-5949
Instrument	ACIS
References	S. Markoff et al, 2008, ApJ, in press
Color Code	X-ray: Blue; Infrared: Red; Optical: Green; Ultraviolet: Purple
Distance Estimate	About 11.6 million light years

