



**Chandra X-ray
Observatory Center**

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Sonification Project: New NASA Black Hole Sonifications with a Remix
Credit: NASA/CXC/SAO/K.Arcand, SYSTEM Sounds (M. Russo, A. Santaguida)

Caption: In this sonification of structures created by a supermassive black hole in the center of the Perseus galaxy cluster, the sound waves astronomers previously identified were extracted in radial directions and made audible for the first time. The signals were then resynthesized into the range of human hearing by scaling them upward by 57 and 58 octaves above their true pitch. The radar-like scan around the image allows you to hear waves emitted in different directions. For M87, three panels of data (X-rays from Chandra, optical light from Hubble, and radio waves from the ALMA) are shown. Each wavelength is mapped to a different range of audible tones. The brightest part of the image corresponds to the loudest portion of the sonification, which is where astronomers find the 6.5-billion solar mass black hole.

Chandra X-ray Observatory ACIS Image

CXC operated for NASA by the Smithsonian Astrophysical Observatory
