



Chandra X-Ray Observatory Center

Harvard-Smithsonian Center for Astrophysics
60 Garden Street, Cambridge, MA 01238 USA
<http://chandra.harvard.edu>

33213.9-275000 & 033251.6-275212: Two distant, dust-shrouded supermassive black holes in the Great Observatory Origins Deep Survey (GOODS) field.

Credit: NASA, ESA, A. M. Koekemoer (STScI), M. Dickinson (NOAO) and The GOODS Team

Three of NASA's Great Observatories - the Hubble Space Telescope, the Chandra X-ray Observatory, and the Spitzer Space Telescope - have found evidence of a hidden population of supermassive black holes in the universe. Two of these objects appear as X-ray sources (large blue central spots) without optical counterparts in the composite Hubble-Chandra images on the upper and lower left panels. The Chandra-Spitzer (X-ray/infrared) images on the upper and lower right panels demonstrate that these mysterious X-ray sources are also detected at infrared wavelengths. This indicates that the galaxies around these supermassive black holes are heavily obscured by dust. Visible light is absorbed by the dust, which is heated by the absorption and glows at infrared wavelengths. Combined data from Chandra, Spitzer and Hubble should soon yield a much more complete census of the number of black holes in the early universe.

Chandra X-ray Observatory ACIS Images