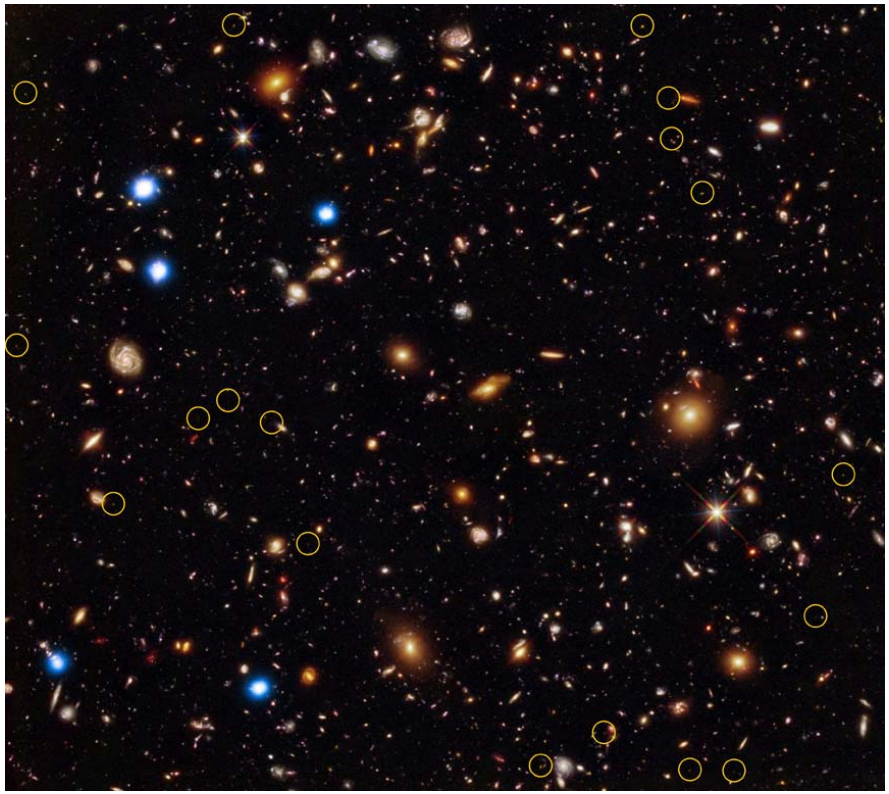
Chandra Science Highlight

Chandra Deep Field South: The Growth of the First Black Holes In the Early Universe



Distance Estimate: 12.7 to 12.9 billion light years (redshift 6 to 7)

Credit: X-ray: NASA/CXC/U.Hawaii/E.Treister et al; Infrared: NASA/STScI/UC Santa Cruz/G.Illingworth et al; Optical: NASA/STScI/S.Beckwith et al.

This composite image from NASA's Chandra X-ray Observatory and Hubble Space Telescope (HST) combines the deepest X-ray, optical, and infrared views of the sky, the strongest Chandra sources are shown in blue. Galaxies at distances between 12.7 and 12.9 billion light years (redshifts between 6 and 7) are marked with the yellow circles.

- A techniques that relies on Chandra's ability to very accurately determine the location of individual X-rays was used to add up all the X-ray counts near the positions of these distant galaxies.
- The "stacked" signals show that the average luminosity due to accreting supermassive black holes, is ~8.4 x 1042 erg/s, in the hard X-ray band, ~9 times higher than in the soft band.
- The luminosity implies that supermassive black holes were accreting and growing rapidly in the epoch 0.7 to 1 billion years after the Big Bang, in tandem with the growth of galaxies.
- The difference in the high and low energy luminosities implies that the supermassive black holes were heavily obscured, and likely to be missed in optical surveys.

References: Treister et al., (2011), Nature 474, 356-358 (16 June 2011)

JUNE 2011

CXC operated for NASA by the Smithsonian Astrophysical Observatory