A Sneak Peek at the First Billion Years of the Universe

This ambitious, community-developed program will expand our understanding of galaxy formation and evolution in the early universe. Hubble, Spitzer, and Chandra will build upon earlier deep-field initiatives with 12 new deep fields, consisting of six galaxy cluster fields and six neighboring parallel fields.

Building on Hubble’s Legacy

- Six parallel fields will be imaged simultaneously for high-quality science products.
- Six galaxy cluster fields will be imaged to high quality for a large number of redshifts, for detection of faint galaxies.
- Parallel fields will be used to observe a large number of lensed objects, including galaxies, quasars, and AGNs.

Getting Deeper Views

- Hubble will provide high-resolution views of the Frontier Fields in both visible light (ACS, blue outlines below) and infrared light (WFC3, red outlines below). The total exposure time per pointing is 103 hours, which will reach a depth of 28.7 magnitude in seven filters.

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Lensed and Parallel Fields

- Each of the targeted galaxy cluster fields, Hubble will simultaneously image a parallel field. In this image, the Frontier Fields images of Abell 2744 (left) and the adjacent parallel field (right) are shown overlaid on an ESO/VLT HAWK-I K-band image. The blue and red boxes are the footprints of ACS and WFC3, respectively.

Models of the mass distributions of the clusters provide magnification maps that help in the analysis of the lensed background galaxies.

Abell 2744

- RED = Magnification map (z = 9)
- BLUE = Mass map
- BACKGROUND = HST imaging

Credit: J. Richard (CRAL Lyon), CATS team, and D. Coe (STScI)

Credit: NASA, ESA, M. Postman and D. Coe (STScI), and the CLASH Team

HST Frontier Fields PIs: J. Lotz & M. Mountain (STScI)

- Hubble has demonstrated the effectiveness of galaxy cluster lensing at uncovering extremely distant objects, such as this lensed, redshift 11 galaxy candidate that appears at three different places.

Six galaxy cluster fields will extend the reach of Hubble, via gravitational lensing, to magnify background galaxies and provide us with views of the most intrinsically faint galaxies ever observed.

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