GRAPES

(Grism ACS Program for Extragalactic Science)

SPECTRA OF THE ULTRA DEEP FIELD

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GRAPES Spectra of the Ultra Deep Field

- We spread the light of each UDF object into a spectrum, using the Hubble's Advanced Camera for Surveys.
- We confirm that 80% of objects having the colors of $z \sim 6$ galaxies indeed ***are*** $z \sim 6$ galaxies.
- Some features in the spectrum yield measurements of galaxy distances.
- These measurements are much more precise than estimates derived from galaxy colors alone.

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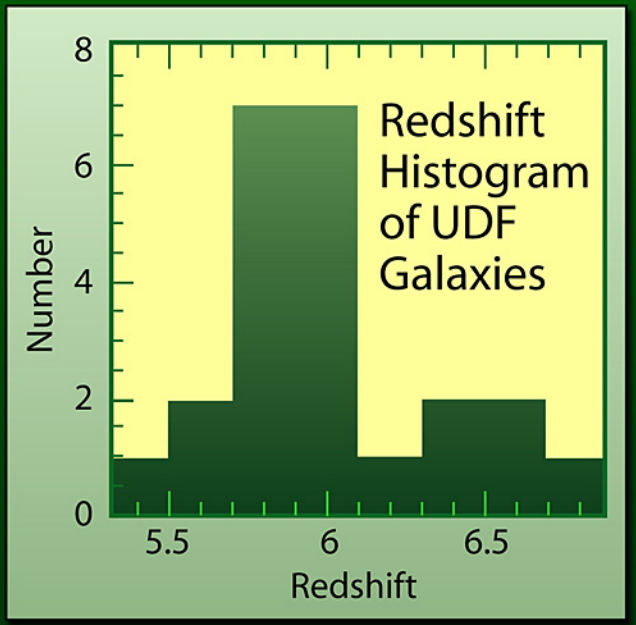
COSMIC DAWN: EARLY RESULTS FROM THE HUBBLE ULTRA DEEP FIELD

September 23, 2004

- Distribution of redshifts for galaxies in the Ultra Deep Field.
- The "spike" at redshift 5.9 shows a "slab" in the galaxy distribution.
- The most distant structure of this type yet seen!



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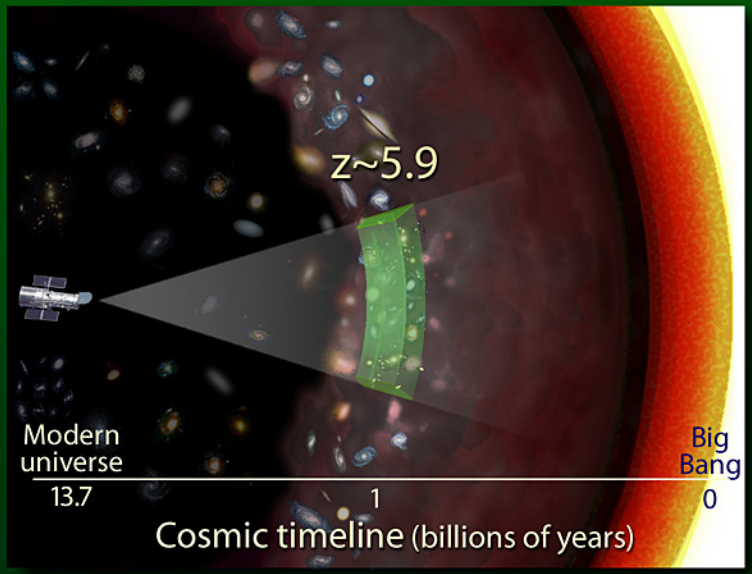
Geometry of the Redshift Spike

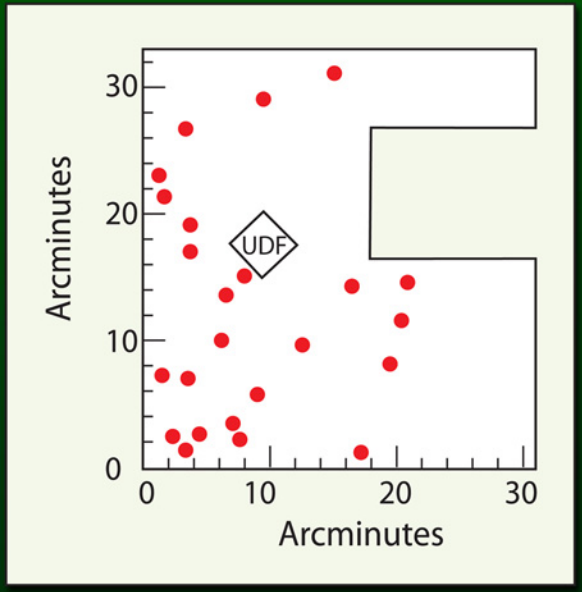
Schematic shows Hubble's view through a "sheet" of galaxies at redshift 5.9. We see a relatively crowded neighborhood when the universe was just 1 billion years old.



A Map of Galaxies in the Redshift Spike

We used the Blanco Telescope at the Cerro Tololo Interamerican Observatory in Chile to identify brighter galaxies at redshift 5.7 to 5.8 in a large region around the UDF.

We see that the "spike" corresponds to a large sheet of galaxies.



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- We obtained spectra of all objects in the UDF.
- Eighty percent of the high-redshift candidates identified by their colors are indeed high-redshift galaxies.
- We obtained distances for these galaxies, and found a spike in the distance distribution at redshift 5.9.
- Ground-based images show that this spike occurs where the UDF line of sight crosses a sheet of galaxies.
- Such concentrations of galaxies and gas mean that reionization will be "patchy."

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