

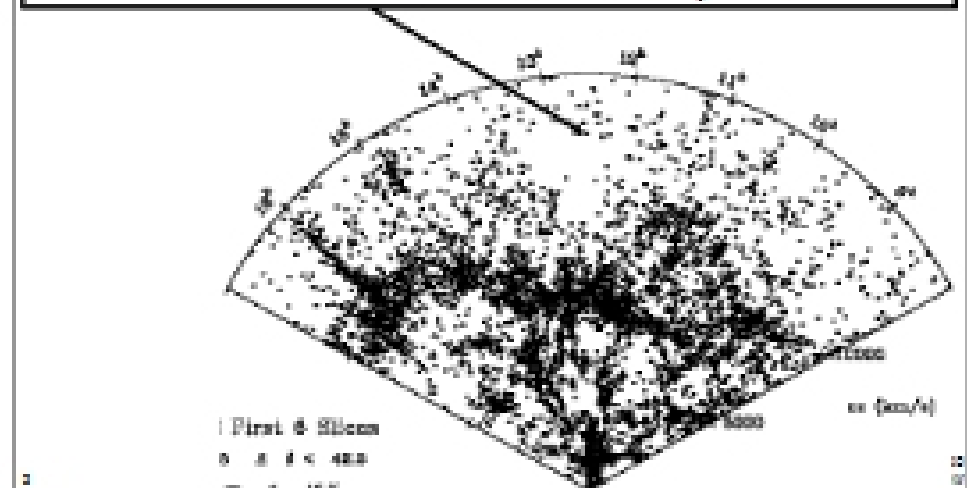
Questions of the Day

- What does the large scale structure of the Universe look like?
- Why would the expansion of the Universe lead everyone, everywhere to measure the Hubble Diagram?
- Why do some things in the Universe NOT expand along with it?
- What is the origin of the cosmological redshift, and how is it different than the Doppler redshift?
- Why does the expansion of the Universe suggest that the Universe had a beginning?

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How to build a better redshift map:

To go farther: Need spectra of fainter galaxies
To cover more area: Need more spectra



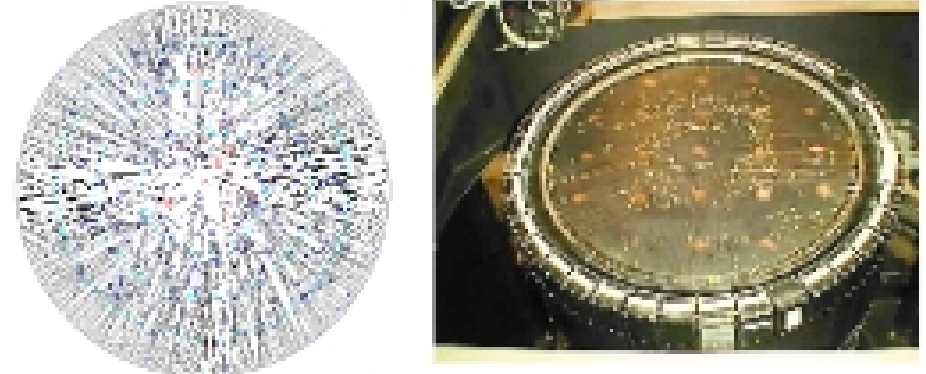
There are special spectrographs that can measure hundreds of redshifts at the same time!



Each red cable contains an optical fiber, which goes into a spectrograph.

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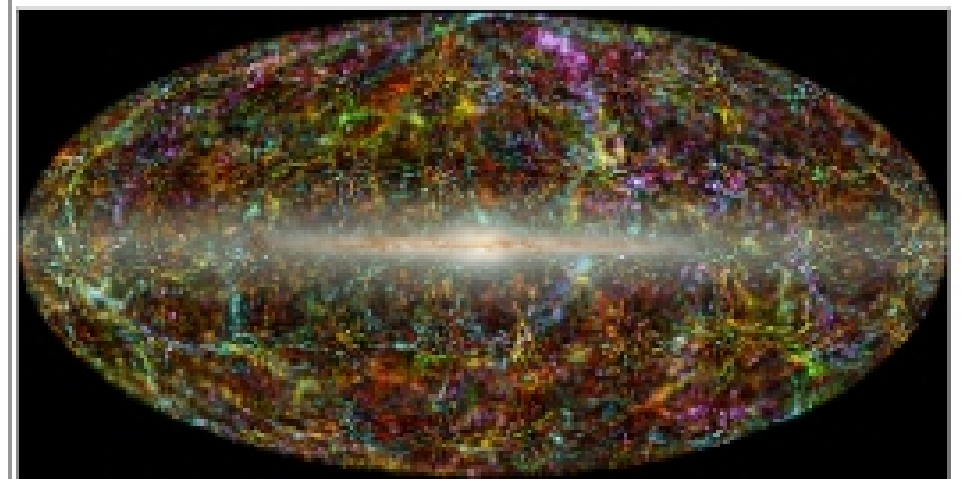
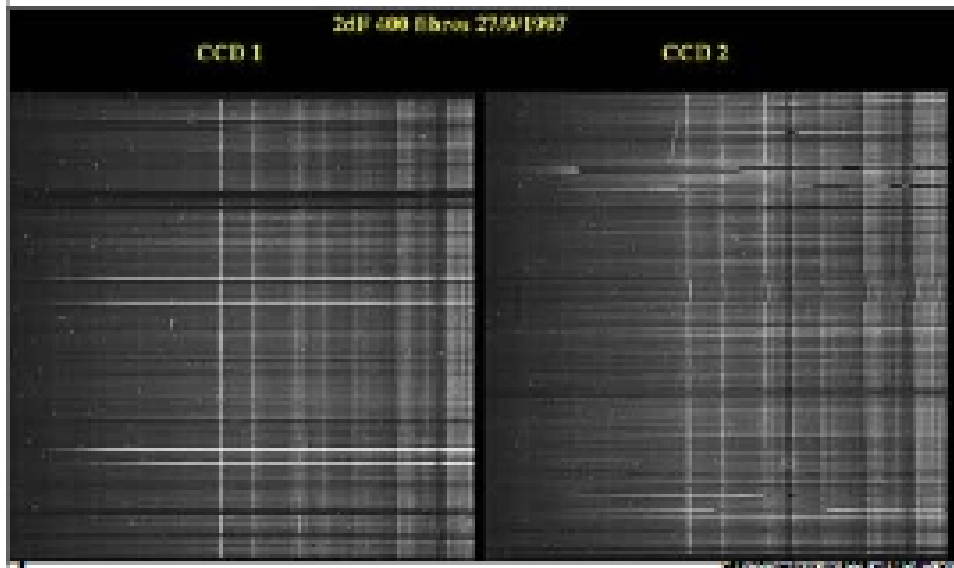
Each fiber gets placed on top of a different galaxy.



Measure spectra of 100's of galaxies at the same time. Gobs of redshifts, quickly!

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400 simultaneous spectra!
 Each row is one spectrum of one galaxy



Spatial distribution of nearby galaxies

Color indicates redshift:

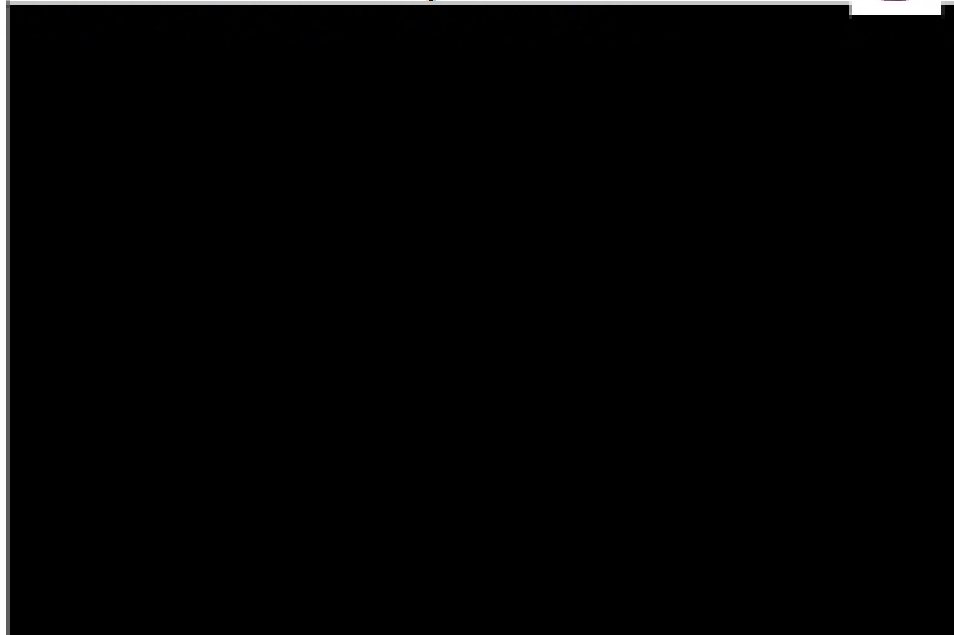
blue = close

red = further ($0.04 < z < 0.1$)

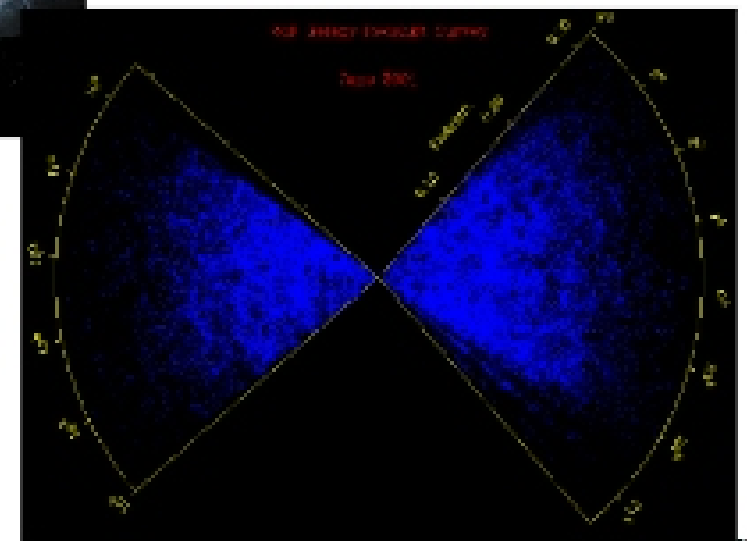
2MASS

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Shells of the Nearby Universe



> 100,000 of galaxies!



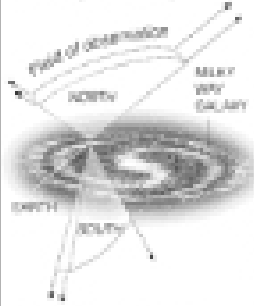
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The Geography of the Universe on the Grandest Scale

An international team of astronomers has measured the distances to more than 100,000 galaxies, allowing them to construct the largest, most detailed map of a large section of the universe near our galaxy.

THE OBSERVATIONS

The directions of the two survey regions are shown below (schematic).

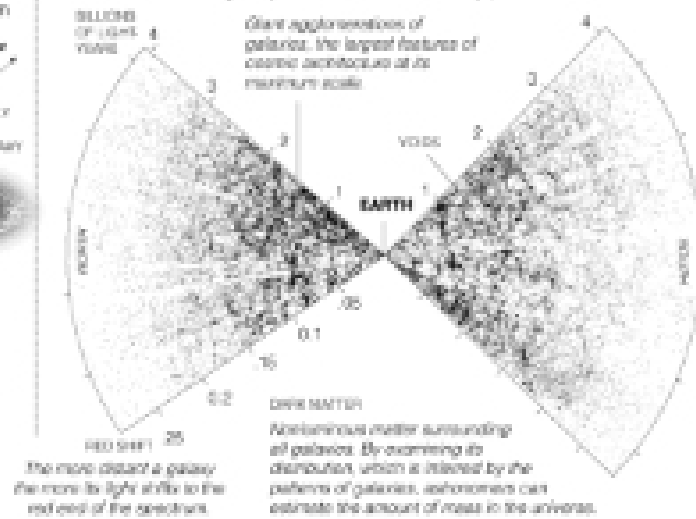


Survey regions extend outward for billions of light-years.

Source: Dr. Robert Behlke, The Australian National University, *The Sloan Digital Sky Survey*.

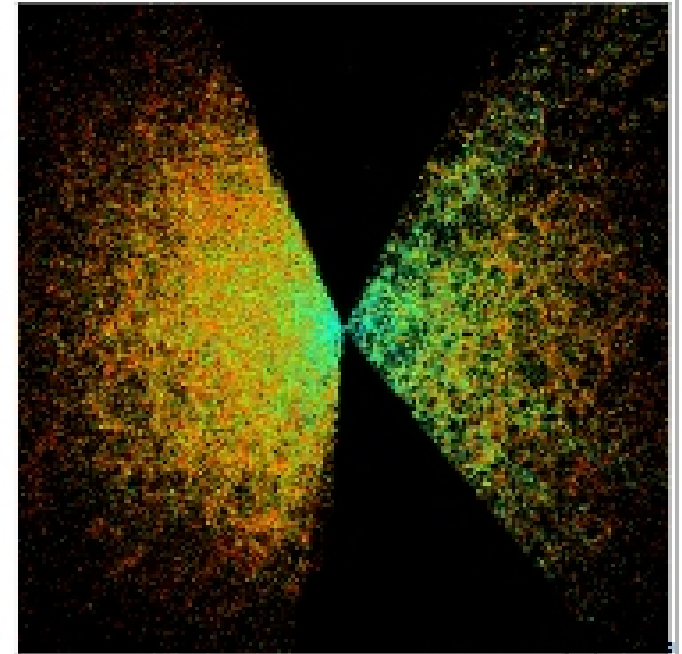
THE MAP

Each dot below is a galaxy, and the team eventually plans to locate 250,000.



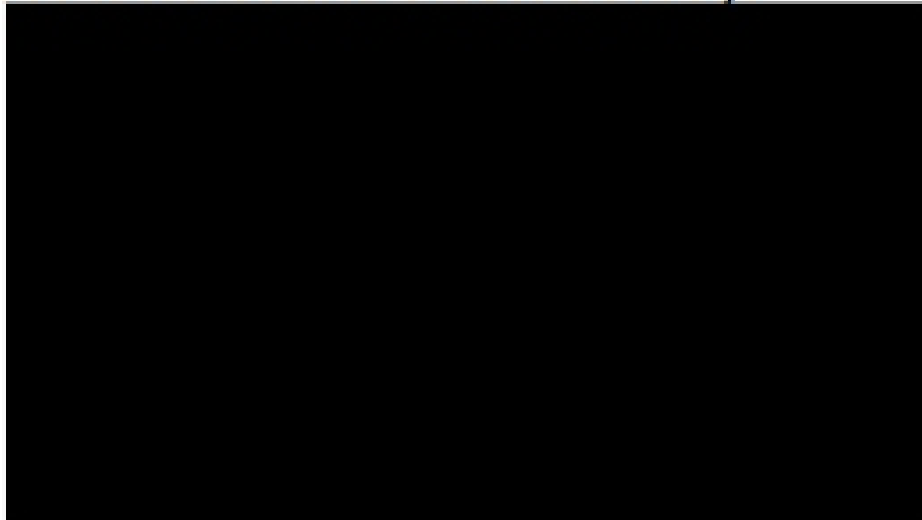
The New York Times. Modification of Peter Dinklage. © www.fox.com Universal Studios

The Sloan Digital Sky Survey (SDSS): nearly 1 million galaxies!



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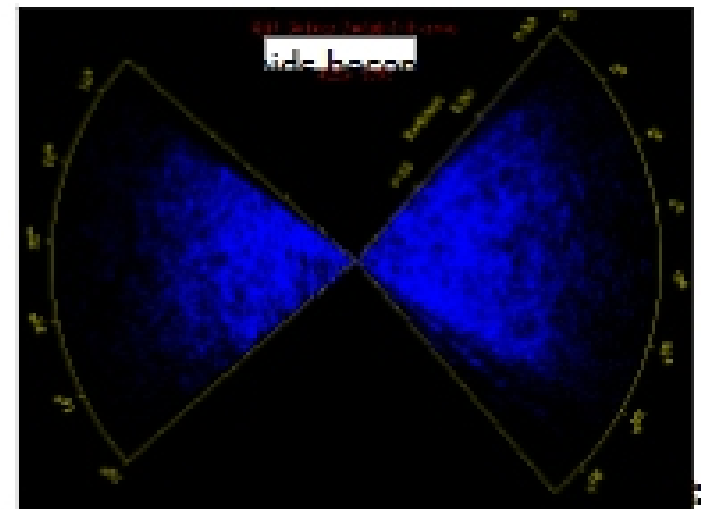
A Movie of the Sloan Survey:



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Astronomy 101, 10/06/2010
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At large scales, the Universe does start to look more homogeneous...



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