

UCI SCHOLARS JOIN HUGE TELESCOPE PROJECT

Monday, September 18, 2006

The \$290 million Large Synoptic Survey Telescope will sample the sky with unmatched speed and precision.

By GARY ROBBINS
The Orange County Register

There are nights when the sky is so clear you feel you sense the fullness of the universe.

It's an illusion.

About 96 percent of the universe is made up of dark energy and dark matter, neither of which can be seen directly and both of which are poorly understood.

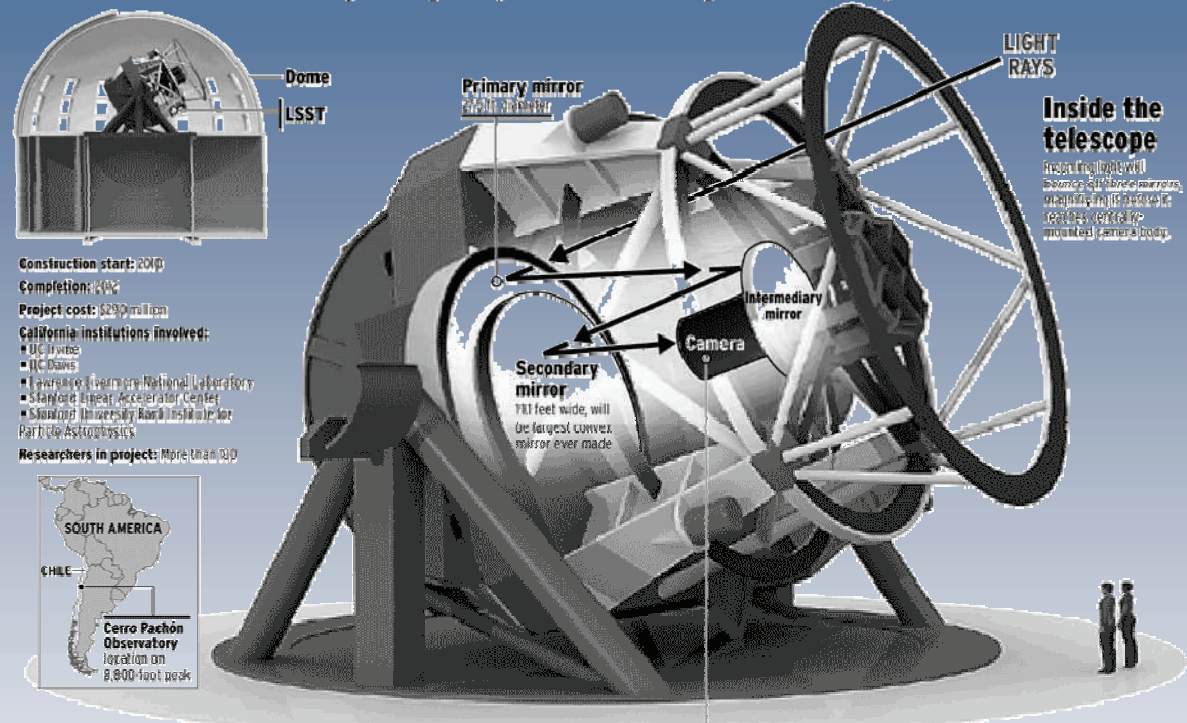
That's likely to change. One of the most powerful and unusual telescopes ever conceived will be built in Chile by a public-private corporation that recently added eight scholars from UC Irvine.

The \$290 million Large Synoptic Survey Telescope will scan large swaths of the sky with unprecedented speed. And it will use its 3 billion pixel camera and 27.5-foot mirror to study the effects that such things as dark energy and dark matter have on stars and galaxies.

The LSST also will examine exploding stars known as supernovas and will hunt for asteroids that might be on a collision course with Earth.

UCI will help develop, and eventually use, the LSST, which will likely become operational in 2012. Tony Tyson, LSST's director, says, "UCI has assembled a group of astronomers and physicists whose interest map well onto LSST's capabilities, from (the solar system) to the edge of the universe. They share our goal of addressing fundamental questions about the universe, including the mysterious 'dark energy.' "

Large Synoptic Survey Telescope



Construction start: 2009
Completion: 2012
Project cost: \$290 million
California institutions involved:
• UC Irvine
• UC Davis
• Lawrence Livermore National Laboratory
• Stanford Linear Accelerator Center
• Stanford University Rank Institute for Particle Astrophysics
Researchers in project: More than 200



WIDE FIELD OF VIEW

The LSST will capture a larger area of the sky with each image than existing telescopes.

Existing telescopes

Typical large telescopes are designed to look very closely at distant objects. But they can only see narrow areas of the sky. It's like looking down a long tube.



Field of view covers an area of the sky roughly 50 times that of the full moon.

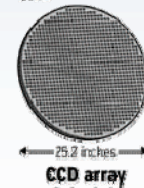
LSST
The LSST is designed to look at a much broader area of the sky. Its shorter length and more highly-curved mirrors allow it to look at large expanses, yet still under high magnification.

Viewing power: Capable of seeing galaxy clusters 8 billion years old and near-Earth asteroids as small as 1,000 feet in diameter.

Camera

Six-foot-long camera housing contains CCD array that will capture the images digitally. Each image will be more than 3 gigapixels (3 billion pixels). Its size, exposures will take 10-15 seconds.

Each night, telescope will generate about 30 terabytes (30 trillion bytes) of data, equivalent to about 3,000 DVDs.



About a thousand times bigger than a typical consumer digital camera.

TELESCOPE'S MISSION

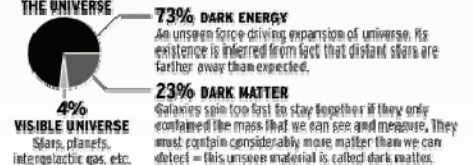
Data gathered will be used for investigation of dark matter, of which most of the universe is composed, and dark energy, a mysterious force accelerating expansion of universe. Main research goals:

- Mapping how galaxies clump together across universe. Changes in clumps over time can provide information about accelerating universe.
 - Studying a pile rump called **gravitational mirage**, which causes light from galaxies behind clumps of dark matter to be deflected and distorted. This is a way to map clusters of dark matter across universe.
 - Monitoring a **million supernovae**, to measure rate of universe expansion.
- LSST also will be used to monitor movement of objects in our solar system, such as potentially hazardous near-Earth asteroids, and objects in Kuiper belt, beyond Neptune's orbit.

Dark matter, dark energy

Most of the universe appears to be composed of matter and energy we can't see or measure, 2 components of the invisible cosmos.

THE UNIVERSE



Phil Loubere, Gary Robbins / The Register

Sources: LSST Corp., Stanford University, NASA, Science Magazine