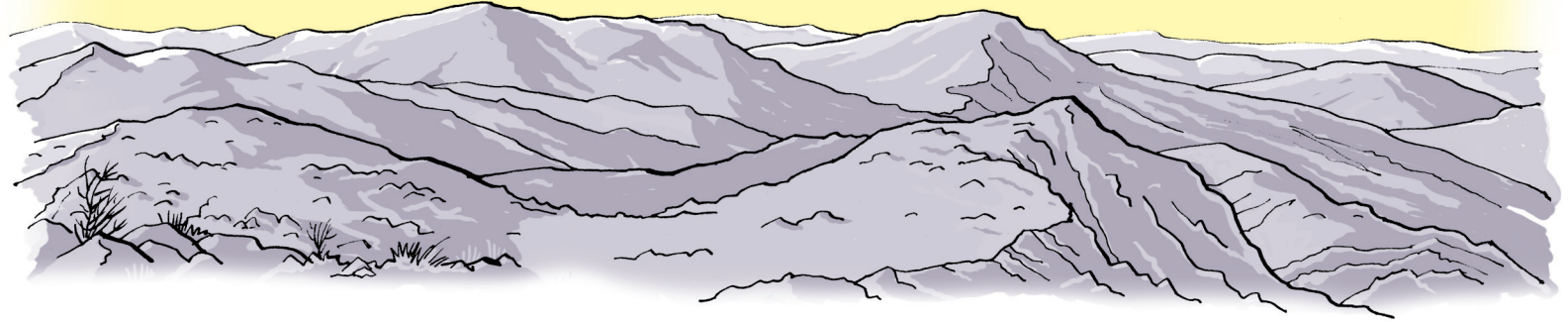
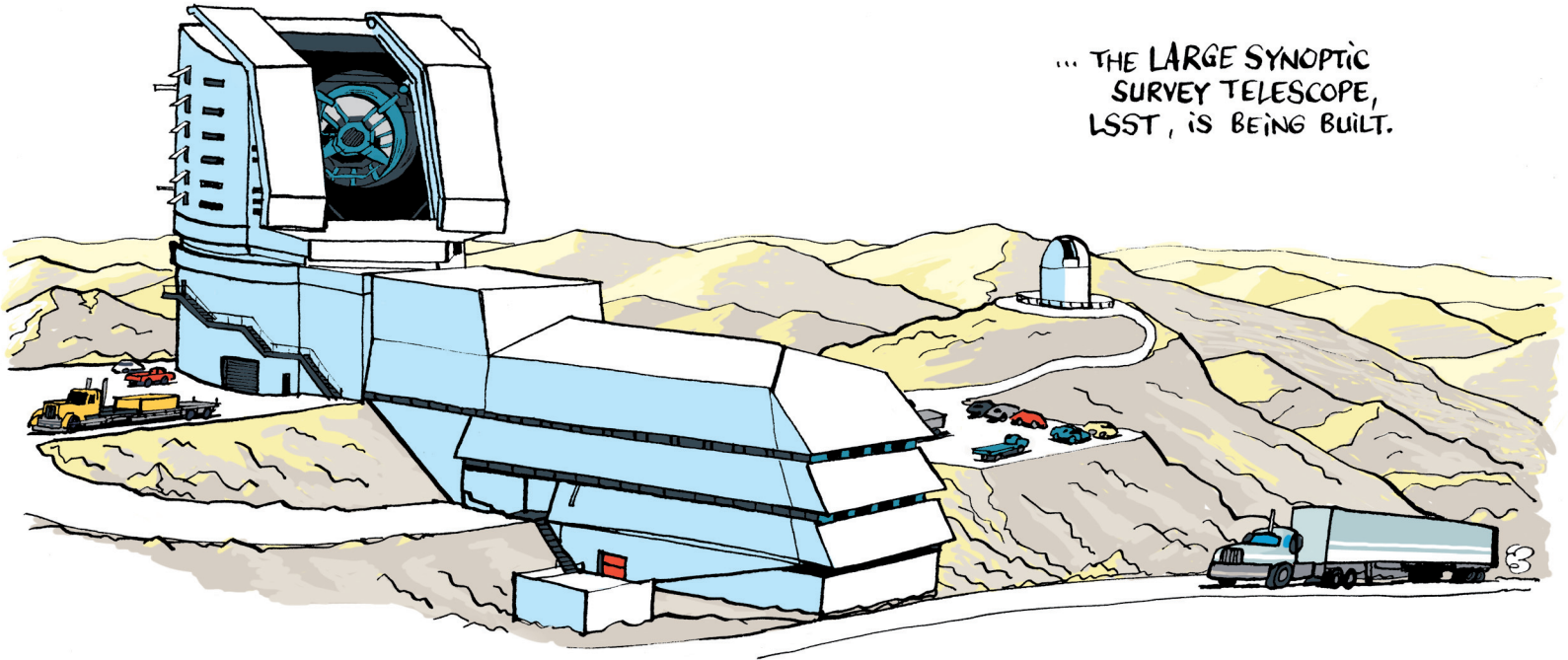


LARGE SYNOPTIC SURVEY TELESCOPE

HERE ON A MOUNTAIN TOP
IN THE CHILEAN DESERT, AT
AN ELEVATION OF NEARLY 9000'...



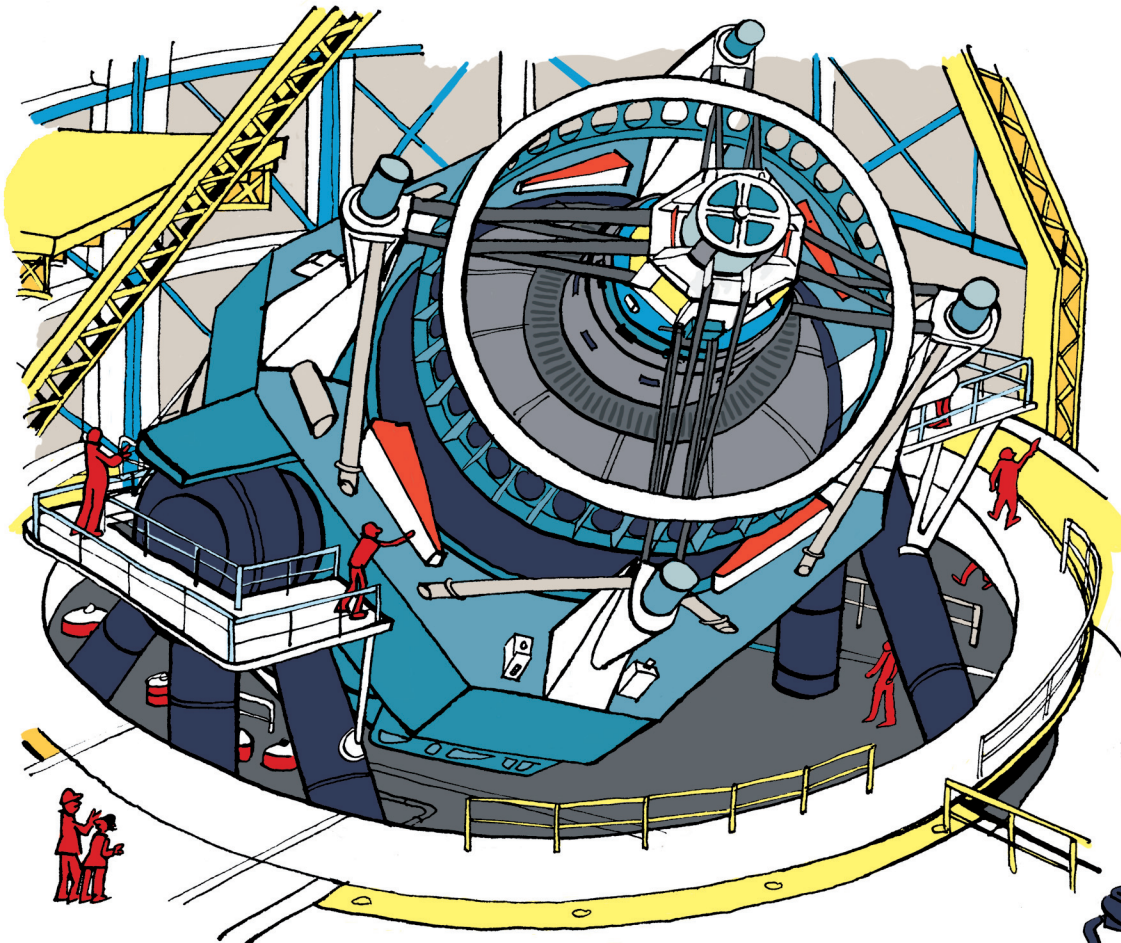
... THE LARGE SYNOPTIC
SURVEY TELESCOPE,
LSST, IS BEING BUILT.



A TELESCOPE THAT BOASTS
THE MOST POWERFUL DIGITAL
CAMERA ON EARTH.

SCIENTISTS CHOSE THE SITE
FOR ITS EXCELLENT OBSERVING
CONDITIONS.

THE CLIMATE IS DRY,
THE AIR IS CLEAR AND
THERE IS VERY LITTLE
LIGHT POLLUTION.

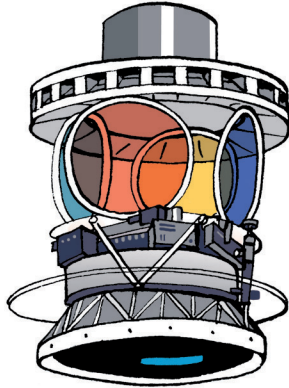


The LSST is the newest telescope in the 8 meter class of telescopes (8 meters being the primary mirror's diameter). These are the largest telescopes currently operating in astronomy. LSST will survey the entire sky with a speed greatly superior to what is currently achievable.

THE CONSTRUCTION OF LSST IS THRU AN AMERICAN, FRENCH AND CHILEAN PARTNERSHIP. THE FRENCH TEAM IS WORKING PRIMARILY ON COMPONENTS OF THE CAMERA.



A CAMERA CAPABLE OF READING OUT 3.2 BILLION PIXELS IN 2 SECONDS.

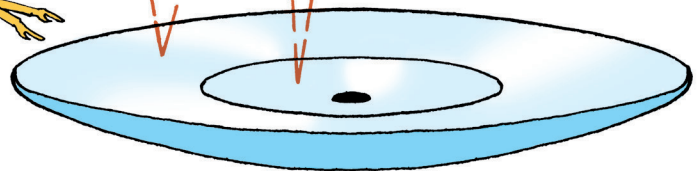


THE STARLIGHT WILL FIRST REFLECT OFF THE IMMENSE PRIMARY MIRROR...

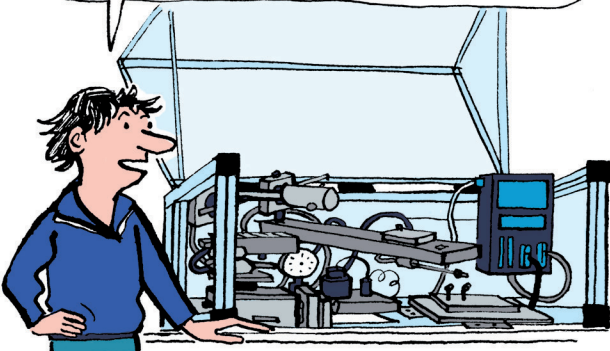


... WILL BEAM UP TO THE SECONDARY MIRROR...

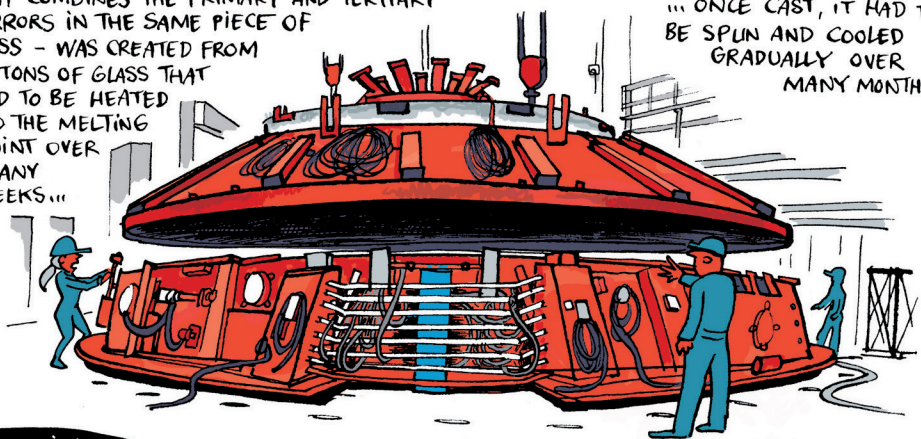
... THEN DOWN TO THE TERTIARY MIRROR. FROM HERE THE TIGHTLY FOCUSED LIGHT ENTERS THE CAMERA.



THE MIRROR'S LARGE DIAMETER, THE WIDE FIELD OF SKY VIEWED AND THE CAMERA'S RAPID EXPOSURES WILL PRODUCE A HUGE VOLUME OF OBSERVATIONS, FAR GREATER THAN HAS EVER BEEN ACHIEVED BEFORE.



THE 8 METER MIRROR - A UNIQUE DESIGN THAT COMBINES THE PRIMARY AND TERTIARY MIRRORS IN THE SAME PIECE OF GLASS - WAS CREATED FROM 26 TONS OF GLASS THAT HAD TO BE HEATED TO THE MELTING POINT OVER MANY WEEKS...



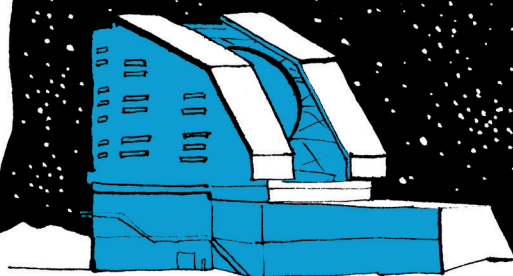
... ONCE CAST, IT HAD TO BE SPUN AND COOLED GRADUALLY OVER MANY MONTHS.

THE BIGGER THE MIRROR IS, THE MORE STARLIGHT WE COLLECT AND THUS THE FARTHER OUT INTO SPACE WE CAN SEE.

IT'S LIKE AN EYE WITH AN EXTRA BIG PUPIL.

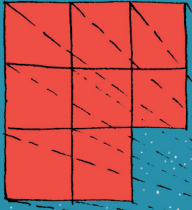
WE ARE GOING TO OBSERVE WHAT WE HAVE NEVER SEEN BEFORE.

AND FROM THESE OBSERVATIONS WE'LL PRODUCE A 3-D MOVIE OF THE ENTIRE VISIBLE UNIVERSE.



Because LSST will return periodically to the same regions of the sky, it will be possible to detect variations in brightness and position of astronomical objects in the sky; like asteroids that may pose a danger to Earth.

OVER 10 YEARS, FROM 2022 THROUGH 2032, LSST WILL OBSERVE THE ENTIRE SKY, REGION BY REGION, EVERY 3 NIGHTS. THAT ADDS UP TO MORE THAN 800 TIMES IN 10 YEARS.



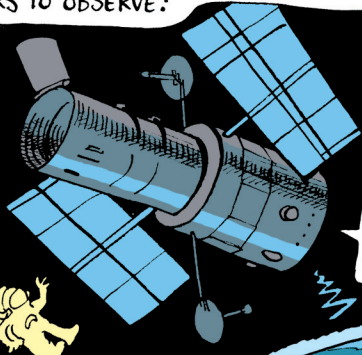
THAT'S A LONG TIME!

TRUE THAT, BUT THE UNIVERSE IS NEARLY 14 BILLION YEARS OLD. SO 10 YEARS IS A DROP IN THE BUCKET!

WE'LL BE ABLE TO COMPARE THE DISTANCES AND SPEEDS OF GALAXIES THAT ARE BILLIONS OF LIGHT-YEARS FROM EARTH.



IN JUST ONE NIGHT, LSST WILL SEE WHAT WOULD TAKE THE HUBBLE SPACE TELESCOPE 125 YEARS TO OBSERVE!

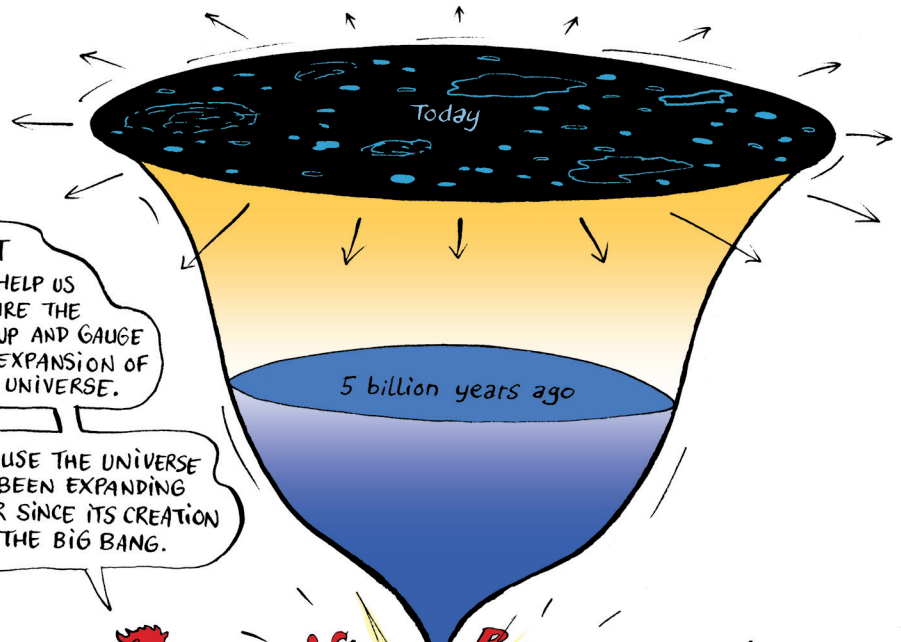


UH, I'M GOOD!

HIYA, HUBBLE, FEELING A LITTLE RUSTY?

LSST WILL HELP US MEASURE THE MAKEUP AND GAUGE THE EXPANSION OF THE UNIVERSE.

BECAUSE THE UNIVERSE HAS BEEN EXPANDING EVER SINCE ITS CREATION AT THE BIG BANG.



THE GALAXIES HAVE BEEN SPREADING APART AT A RATE FAR FASTER...

... THAN WE CAN EXPLAIN.

LSST SHOULD PROVIDE SOME ANSWERS AND HELP US UNDERSTAND THE MYSTERIES OF WHAT SCIENTISTS CALL THE DARK SECTOR: DARK ENERGY AND DARK MATTER.

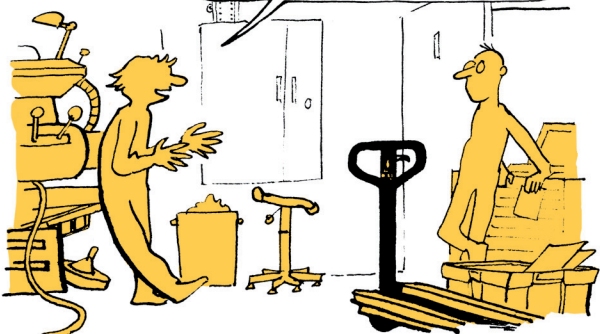
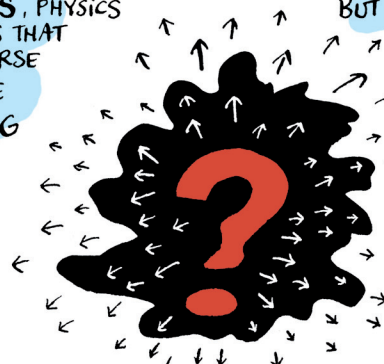
AND WHAT IS THAT, YOU ASK?

DARK ENERGY IS AN UNKNOWN, POWERFUL ENERGY THAT SCIENTISTS BELIEVE IS RESPONSIBLE FOR THE EXPANSION OF THE UNIVERSE.

GIVEN ITS ENORMOUS MASS, PHYSICS TELLS US THAT THE UNIVERSE SHOULD BE COLLAPSING ON ITSELF...

BUT IT IS NOT COLLAPSING.

ON THE CONTRARY, THE UNIVERSE IS EXPANDING FASTER AND FASTER BECAUSE OF THE EXISTENCE OF THIS INVISIBLE POWER: DARK ENERGY.



The entire sky has already been observed but not in the most comprehensive way.
Thanks to its extremely large field of view, the Large Synoptic Survey Telescope (synoptic meaning comprehensive) will produce the most complete map of the universe ever made.

DARK MATTER IS NOT LIKE VISIBLE MATTER. WE KNOW THAT VISIBLE MATTER, MADE UP OF PROTONS AND NEUTRONS...

... CONSTITUTES ONLY ABOUT 16% OF THE MASS OF THE UNIVERSE.

NO ONE HAS EVER SEEN DARK MATTER, AND IT CONTINUES TO EVADE ALL ATTEMPTS AT DETECTION, YET IT ACCOUNTS FOR 84% OF THE MASS OF THE UNIVERSE.

IN SPACE, PLANETS, STARS AND GALAXIES HOLD TOGETHER BECAUSE OF THE FORCE OF GRAVITY.

CELESTIAL BODIES ARE PULLED TOWARD EACH OTHER AND REMAIN ATTRACTED BECAUSE OF THEIR MASS.

BUT VISIBLE MATTER ALONE ISN'T SUFFICIENT TO EXPLAIN HOW THE GALAXIES REMAIN ATTRACTED TO EACH OTHER.

THE REASON MUST COME FROM THE EXISTENCE OF DARK MATTER WHICH WOULD PROVIDE THE MISSING MASS.

THOUGH NO ONE HAS EVER SEEN DARK MATTER, SCIENTISTS HAVE OBSERVED ITS GRAVITATIONAL EFFECTS ON THE UNIVERSE.

JUST LIKE THIS INK STAIN IS PROOF...

... THAT THERE IS A DARK PEN SOMEWHERE.

LSST IS GOING TO OPEN A PORTAL FOR US TO STUDY THE DARK SECTOR.

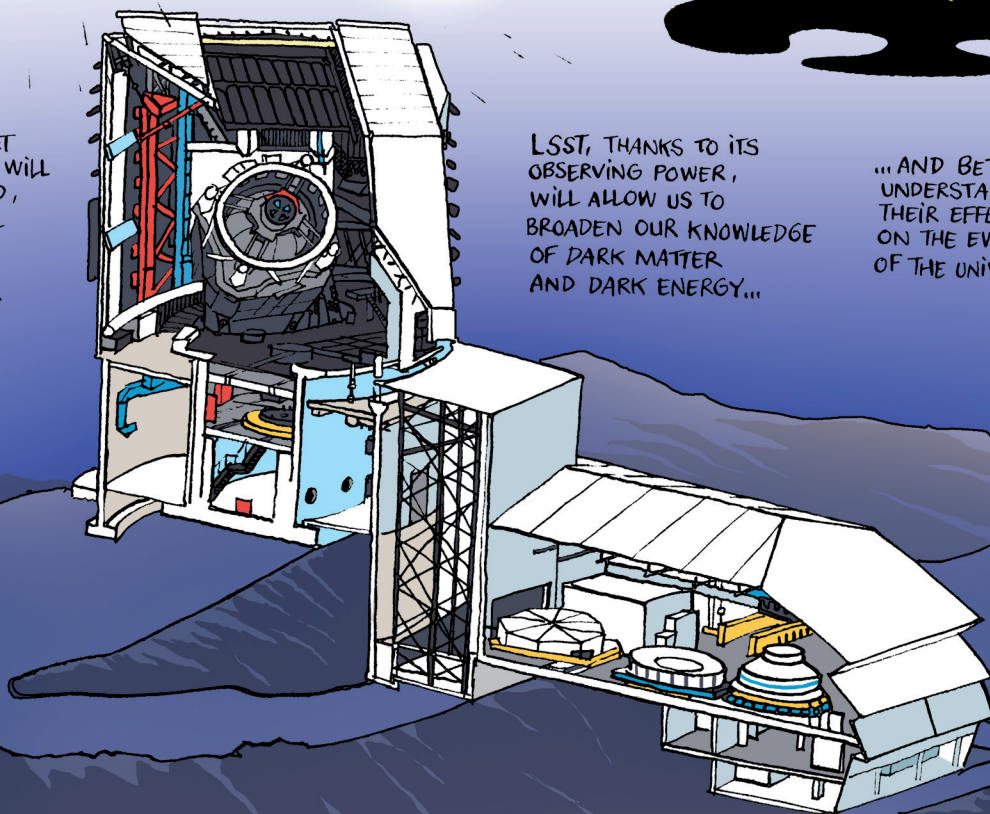
THIS ENIGMA OF THE UNIVERSE.

WE DON'T YET KNOW WHAT WILL BE REVEALED, BUT WE WILL CERTAINLY DISCOVER SOMETHING.

LSST, THANKS TO ITS OBSERVING POWER, WILL ALLOW US TO BROADEN OUR KNOWLEDGE OF DARK MATTER AND DARK ENERGY...

... AND BETTER UNDERSTAND THEIR EFFECTS ON THE EVOLUTION OF THE UNIVERSE.

EACH TIME WE'VE LOOKED AT THE SKY IN A NEW MANNER, THERE HAVE BEEN SURPRISES. EXPECT SOME GREAT DISCOVERIES!



Duhoo