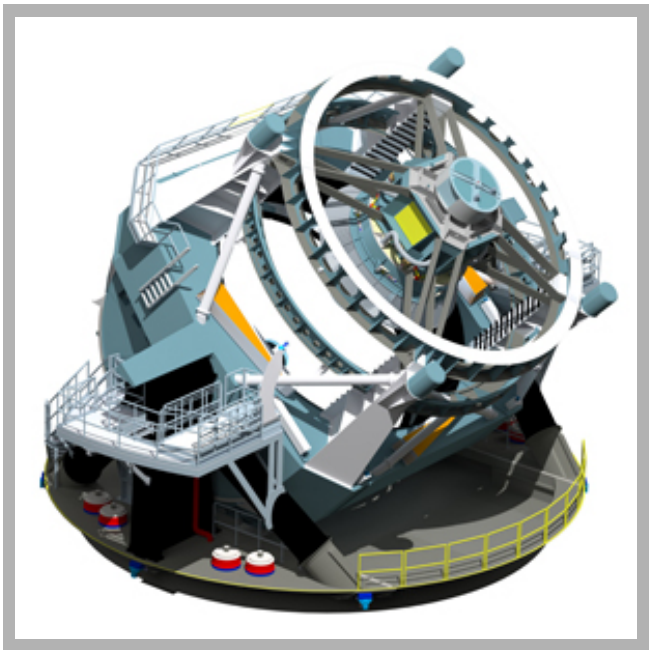
How We'll Spot the Most Dangerous Asteroids

Zeljko Ivezic has been an astronomer since the third grade. Since becoming an astronomy professor, he's worked on the Sloan Digital Sky Survey (SDSS) to map a quarter of the night sky and catalog more than 500 million objects. Today, Ivezic is the project scientist for the Large Synoptic Survey Telescope (LSST), which will scan the entire night sky twice a week when it becomes operational in 2021. With its unprecedented ability to detect faint and fast-moving objects, LSST will help fulfill NASA's congressional mandate to identify and map 90 percent of near-Earth objects more than 140 meters wide.

By Kiona Smith-Strickland

How urgent is the detection of near-Earth objects like asteroids and comets?

Objects larger than about 1 kilometer (0.6 mile) that could destroy life on Earth strike every few hundred thousand years. This is on average—at least in principle, a collision could happen much sooner. While we do not know of any particular object that will impact Earth soon, it is entirely possible that smaller objects, which are not fully cataloged, might appear from "nowhere," as recently happened over Russia. If one simply compares the cost of a survey such as LSST to the potential damage it could help prevent, it seems rational to argue for immediate action.



Large Synoptic Survey Telescope (LSST) Rendering

LSST Corporation

June 6, 2013 2:51 PM

Q A Q

Alexander Deutsch at the University of Münster in Germany recently said, "The small projectiles are not very dangerous, and the opinion is that the larger ones, or at least most of the larger ones, are now known. I don't think more money will produce more data." What is your response to that?

A "The larger ones" that are mostly cataloged are larger than 1 kilometer. The Chelyabinsk meteor was about 20 meters [50 times smaller], and it still caused substantial damage. There are lots of objects in this size range between 20 meters and 1 kilometer, and I would not so easily dismiss their importance.

Q If LSST had been operational earlier this year, might it have detected the Russian Chelyabinsk meteor?

A LSST certainly would be more capable of detecting it than any existing system, but it is hard to claim with certainty that it would have detected it, since details depend on the object's orbit, time of day, observing pattern, etc. Even smaller existing systems might have detected the Chelyabinsk meteor under some circumstances. In addition, it is, of course, not the same to detect it a few hours before the impact as opposed to a few days.

Q What can be done with earlier warnings about a potential impact?

A Today we might get a few days' warning. With LSST, we could get a few weeks' warning and, for example, would be evacuating people from coastal areas. Most likely we would have objects that would hit oceans, and the potential deaths would be coming from tsunamis. I believe that the Federal Emergency Management Agency [FEMA] has authority in this case, as well as proper evacuation protocols and procedures in place.

Q Are there more aggressive asteroid mitigation strategies? How far are we from being able to implement them?

A In some cases you can mitigate them—you can change their orbit. There are various ways. One is to send a nuclear device. It has its own risks—for example, if it's a significant amount of explosive material [and] something happens on the launch. If you discover them early enough, you could do various things like have a spaceship that comes close to the asteroid... and then, with boosters on the spaceship, you would slightly change the orbit, sufficient to miss Earth.

I am not an expert in this field, but I would guess [you would do this] decades [before it could happen]. Even if an impact was expected with certainty, and many countries worked together, it would take years to develop an appropriate program.

Q What are your thoughts on NASA's recently announced plan to capture an asteroid for study?

A This is a very exciting idea! Although it sounds like science fiction, it appears feasible in our lifetime.

Q What can comets and asteroids tell us about the early solar system?

A They are mostly useful for studying the conditions in the early solar system. For example, asteroids and comets contain the original solid material from which other planets formed. They can be used for important tests of various theories of solar system formation and its subsequent evolution.

Q You have an asteroid named after you, right?

A Asteroids were not a primary science driver for SDSS, but we had to identify them because they had negative impact on other science programs. With two colleagues, Robert Lupton from Princeton University and Mario Juric from the University of Arizona [both also work on LSST], we developed software that identified asteroids in SDSS data. For many of those, SDSS received naming rights, and the project decided to name an object after each member

of the SDSS collaboration. This is how I ended up with 202930 Ivezic.

Q What influence did the Sloan Digital Sky Survey have on your current work with LSST?

A SDSS was a pioneering survey that helped a lot to convince the scientific community and funding agencies that LSST is a great idea. My work on SDSS gave me experience with optical sky surveying that is now very useful in designing and planning for LSST.

TAGS: telescopes, asteroids, astronomy

Related Stories

5 Tremendous Telescopes of the Future

Star Party: 100 Hours of Astronomy At a Telescope Near You

The 5 Most Powerful Telescopes , and 5 That Will Define the Future of Astronomy

How To Build a Dobsonian Telescope: DIY Astronomy Project

Why the World Needs Asteroid Insurance: Resident Astronaut

The Best in Armchair Astronomy

Post a comment