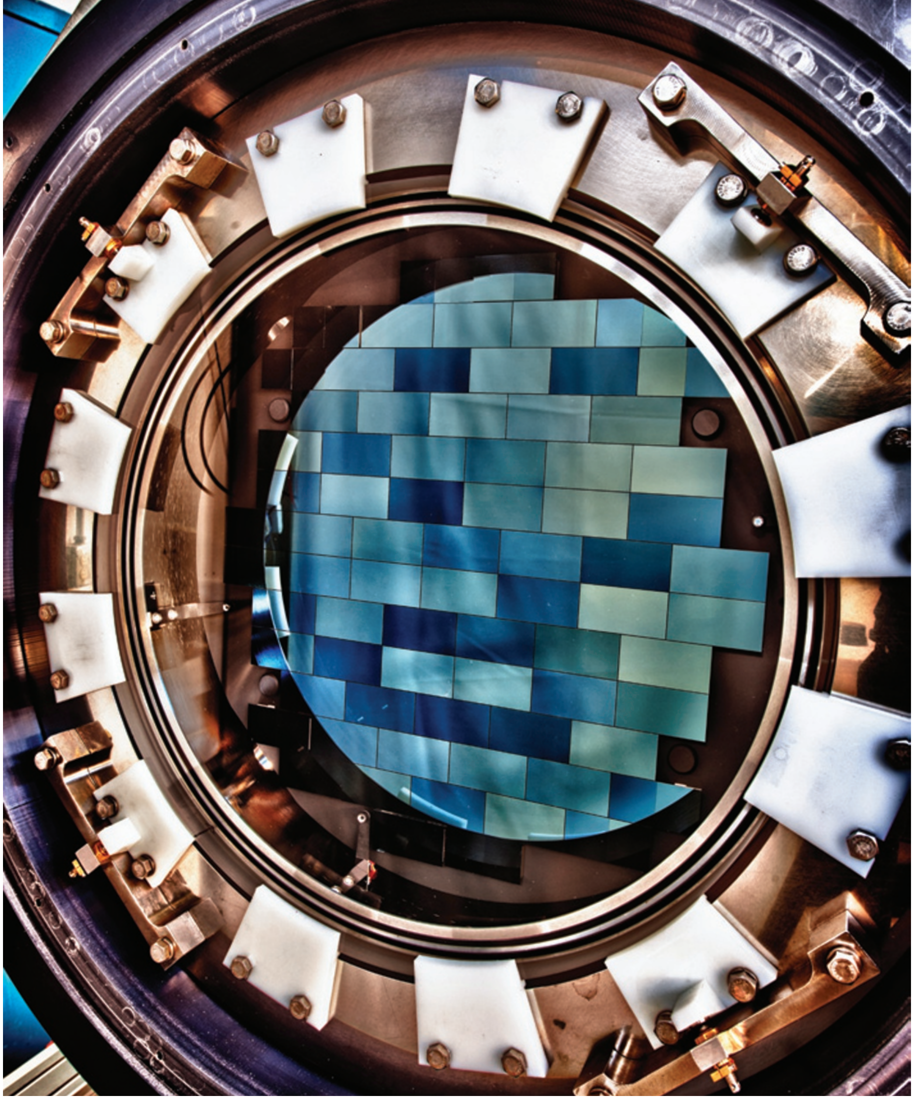
against scientists through a settlement agreement, which helps the reputedly overstretched office to save on legal resources. Hauser's settlement means that he escapes the harshest possible punishment — a ban on future NIH funding — and must instead submit a supervisory plan that will ensure integrity if he applies to the agency for any future research grants. (The agency spent at least US$790,000 on grants that funded work affected by the misconduct.)

Bennett Galef, an expert in animal behaviour at McMaster University in Hamilton, Canada, reviewed evidence used in the Harvard investigation at the request of Hauser's lawyer, and questions the ORI's use of the word "fabricated" to describe the errors in the *Cognition* paper[1]. "That is a conceivable read of what happened, but it's slanted," he says. According to Galef, lab records show that in the study, which examined habituation to sound patterns, two groups of tamarin monkeys were played the same stimuli instead of different ones, as the paper reported. Galef says that this was because of an error in the computer program that played the stimuli, which the authors plausibly didn't know about because the protocol called for them to be blinded to the stimuli at the time they coded the monkeys' responses. "It was a big mistake. It was definitely a disaster, but whether there was any fabrication, you don't know," says Galef.

ORI officials familiar with Hauser's case could not comment because of government privacy rules. The inspector-general of the National Science Foundation, which also funded Hauser, is still looking into one of the misconduct counts found by Harvard; the remaining instance was referred to the ORI but has been deemed outside its statute of limitations. Harvard says that the graduate students and postdocs who were working in Hauser's lab have been relocated to other labs within the university.

Hauser has now begun a different chapter in his life, working with at-risk youth. His website states that he has co-founded a company called Gamience, which develops computer games to teach self-control and other cognitive skills, and is working with a non-profit company that serves schools on Cape Cod, called the Cape Cod Collaborative, in Bourne, Massachusetts. "This work is deeply satisfying and I look forward to making new contributions to human welfare, education and the role of scientific knowledge in understanding human nature," Hauser says. ■

1. Hauser, M. D., Weiss, D. & Marcus, G. *Cognition* **86,** B15–B22 (2002).
2. Hauser, M. D., Glynn, D. & Wood, J. *Proc. R. Soc. B* **274,** 1913–1918 (2007).
3. Wood, J. N., Glynn, D. D., Phillips, B. C. & Hauser, M. D. *Science* **317,** 1402–1405 (2007).



R. HAHN/FERMILAB

The Dark Energy Survey camera will investigate millions of galaxies for the subtle effects of weak lensing.

COSMOLOGY

Cameras to focus on dark energy

A pair of detectors that measure minute distortions in images of distant galaxies will probe the riddle of cosmic acceleration.

BY ERIC HAND

Even the best pictures of a distant galaxy are a bit lopsided. But this is an attribute, not a bug. Because mass distorts space-time, light coming from distant galaxies is bent as it passes through intervening shoals of invisible matter, leaving the images of these distant objects minutely sheared and stretched.

Two astronomical surveys now scheduled to come online seek to take advantage of this effect, which is known as weak gravitational lensing. The surveys aim to use the technique to get a firmer handle on dark energy, the mysterious force that is apparently speeding up the expansion of the Universe. By observing the patterns of distortions across large swathes of sky (see 'Falling into line'), astronomers hope to map the density and distribution of dark matter, the web-like invisible scaffolding around which visible matter is thought to have first coalesced. Then, by looking at changes in this hidden web across cosmic time, they hope to discern the imprint of dark energy.

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Observers already study the effects of dark energy by tracking cosmic landmarks: the standard candles of distant supernovae and the standard rulers of ripples in the distribution of galaxies. But those techniques reveal only how the Universe's expansion rate has changed because of dark energy. Weak lensing offers an extra prize: the distortions hold clues to the action of gravity at far-off locales. The technique can thus address an increasingly pressing question for theorists: what if the Universe's accelerated expansion is not the result of dark energy's mysterious anti-gravitational force, but is instead a sign that gravity behaves differently in different parts of the Universe?

"It provides unfettered insight into the properties of gravity that we can't get by other techniques," says Rachel Bean, an astrophysicist at Cornell University in Ithaca, New York. "Its potential is massive, but so are the challenges."

Unlike strong gravitational lensing, in which a major concentration of mass markedly distorts the image of a single galaxy, the subtle effects of weak lensing can be detected only in detailed surveys of millions of galaxies. One of the new efforts will use the Hyper Suprime-Cam (HSC), which achieved first light on 28 August on the 8.2-metre Subaru telescope in Hawaii. By 2018, it aims to have imaged 10 million galaxies over a 1,500-square-degree-swathe of the sky, says Satoshi Miyazaki of the National Astronomical Observatory of Japan in Mitaka, who is the principal investigator of the HSC survey.

A rival project, the Dark Energy Survey (DES), is set to start operating later this month on the 4-metre Blanco telescope in Chile, says its principal investigator, Josh Frieman of the Fermi National Accelerator Laboratory in Batavia, Illinois. Being the main project for the Blanco telescope, the DES will get more observing nights than the HSC, allowing it to image 300 million galaxies over 5,000 square degrees by 2018. But its smaller telescope means that it will not be able to peer as deeply into the distant Universe as the HSC survey.

Even with these massive digital cameras — 870 million pixels for the HSC and 570 million pixels for the DES — weak lensing "is a very, very difficult measurement to make", says Bean. To detect the subtle distortions caused by lensing, for example, astronomers must subtract aberrations caused by the optics of the telescope and by Earth's atmosphere.

Doing the measurements from space could help. The European Space Agency is planning to launch a dark-energy probe called Euclid in 2019. And in the United States, an as-yet-unfunded dark-energy mission called the Wide-Field Infrared Survey Telescope, which would dedicate much of its time to weak-lensing measurements, was ranked as the top priority for space-based astronomy in a 2010 decadal survey.

Some astronomers doubt that the technique can outperform supernova surveys and measurements of baryonic acoustic oscillations — ripples in cosmic structure dating from several hundred thousand years after the Big Bang. "I think the jury's still out," says David Schlegel, principal investigator of the Baryon Oscillation Spectroscopic Survey at the Lawrence Berkeley National Laboratory in Berkeley, California. He points out, for instance, that a key assumption in weak lensing — that galaxies are oriented randomly — is turning out not to be true, forcing astronomers to correct for a systematic effect.

"The technique's potential is massive, but so are the challenges."

But others say that it is important to take diverse approaches to the dark-energy mystery. Chris Stubbs, an astrophysicist at Harvard University in Cambridge, Massachusetts, says that, a decade ago, astronomers were intent on simply proving that the effect was real. Now there is little doubt, and they need techniques such as weak lensing to explore more-detailed questions — for instance, whether the effect varies with distance, direction or the density of matter, and whether the effects of dark energy can be distinguished from those of variable gravity. "We are only now entering an era where we're attacking the dark-energy problem with instruments and experiments that were explicitly optimized for that purpose," says Stubbs. ■

FALLING INTO LINE

When light from a randomly oriented group of galaxies passes through a region influenced by the gravity of a large concentration of dark matter, the galaxy images show a slight alignment along a particular direction. Such distortions can reveal the changing concentrations of matter at different cosmic times.