

## PHYSICS

# Satellites test general relativity

*Wayward craft find new use.*

BY ELIZABETH GIBNEY

Two satellites that were accidentally launched into the wrong orbit will be repurposed in the most stringent test yet of a prediction made by Albert Einstein's general theory of relativity — that clocks run more slowly the closer they are to heavy objects.

The satellites, operated by the European Space Agency (ESA), were mislaunched last year by a Russian Soyuz rocket that put them into elliptical, rather than circular, orbits. This left them unfit for their intended use as part of a European global-navigation system called Galileo. But the two craft have atomic clocks on board. According to general relativity, the clocks' ticking should slow down as the satellites move closer to Earth in their orbits, because the planet's gravity bends the fabric of space-time.

On 9 November, ESA announced that teams at Germany's Center of Applied Space Technology and Microgravity in Bremen and at the department of Time-Space Reference Systems at the Paris Observatory will track this acceleration and deceleration. By comparing the speed of the clocks' ticking with the crafts' known altitudes — pinpointed by lasers from monitoring stations on the ground — the researchers can test the accuracy of Einstein's theory.

In 1976, NASA launched an atomic clock aboard Gravity Probe A from Earth's surface, sending it 10,000 kilometres into space, to compare its ticking with that of an identical clock on the ground. But that probe stayed in the air for just shy of two hours. The Galileo satellites, by contrast, will conduct experiments for a year.

ESA expects the results to be four times more accurate than those of Gravity Probe A — enabling the agency to test whether theory agrees with reality to a precision of below 0.004%.

No one expects Einstein's theory, which was published almost 100 years ago (see [nature.com/relativity100](http://nature.com/relativity100)), to break down — it has passed every test thrown at it. A future ESA experiment called the Atomic Clock Ensemble in Space, or ACES, is scheduled to fly on the International Space Station in 2017. ACES will push Einstein's theory to even greater limits, testing it with a precision that could reach 0.0002%. ■



SUZANNE KREITER/THE BOSTON GLOBE/GETTY

Minority researchers in the United States consistently win NIH funding at lower rates than their peers.

## EQUALITY

# Racial bias haunts NIH grants

*Minorities are still less likely to get biomedical funding.*

BY ERIKA CHECK HAYDEN

Minority scientists are less likely than their peers to have biomedical research grants funded — and the disparity has barely changed in 30 years, according to data from the US National Institutes of Health (NIH). The numbers, requested by two California researchers to reignite discussion about diversity in the scientific workforce, show no consistent improvement, even though the proportion of minority grant reviewers has climbed.

Pulmonologist Esteban Burchard and epidemiologist Sam Oh of the University of California, San Francisco, shared the data with *Nature* after obtaining them from the NIH through a request under the Freedom of Information Act. The figures show that under-represented minorities have been awarded NIH grants at 78–90% the rate of white and mixed-race applicants every year from 1985 to 2013 (see 'Persistent gap').

Burchard and Oh had hypothesized that they might see an increase in funding for under-represented minorities after a 1994 NIH mandate that investigators must include women and minorities in clinical studies. They reasoned that the increased

emphasis on minority health would create a virtuous circle by boosting grants to minority researchers, who, they posit, would be more likely to focus on those groups and help to fulfil the mandate.

But there seems to have been no such increase. As a result, Burchard and Oh worry that a racial divide could develop between researchers and the people they study. Burchard notes, for example, that a lack of diversity among trial participants may have caused problems for two drug companies that produced an anticlotting drug that had reduced efficacy in East Asians and Pacific Islanders. The attorney-general of Hawaii filed a lawsuit against the companies last year for failing to disclose the issue. "It's a public-health problem," he says.

In a commentary in *PLoS Medicine* next month, Burchard and Oh will argue that scientific workforce diversity helps to ensure that research addresses issues relevant to all.

Other researchers say that airing the new data serves a purpose. "It raises the question in all of us as to the root causes of these disparities," says David Burgess, a cell biologist at Boston College in Chestnut Hill, Massachusetts, who is lead principal investigator of the National Research Mentoring Network,

SOURCE: E. BURCHARD/S. OH

a US\$19-million initiative announced by the NIH in October 2014 to improve mentorship of scientists from under-represented groups.

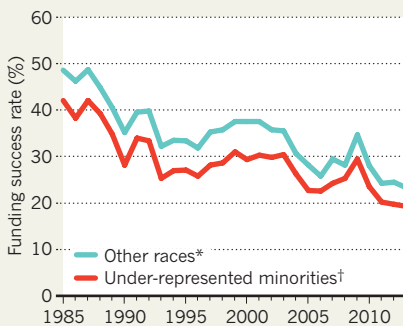
But the data offer no clues to such questions, counters Raynard Kington, president of Grinnell College in Iowa and former deputy director of the NIH. “It’s not surprising, not new, and doesn’t answer questions of how we can intervene to give every scientist the opportunity to contribute,” he says. In 2011, he co-authored a paper that found that black applicants for NIH funding were about two-thirds as likely as white people to receive grants during the years 2000–06, even accounting for factors such as publication record and training (D. K. Ginther *et al. Science* **333**, 1015–1019; 2011).

He and others point to evidence that funding can be influenced by personal bias. In February, researchers who analysed nearly 19,000 North American faculty hiring decisions in computer science, business and history reported that elite institutions predominantly hire people who earn their doctorates from the same or other elite schools. One-quarter of the 461 institutions surveyed had trained 71–86% of tenure-track faculty, depending on the discipline (A. Clauset *et al. Sci. Adv.* **1**, e1400005; 2015).

Such studies hold evidence of what biologist Margaret Werner-Washburne of the University of New Mexico in Albuquerque calls “positive bias” or in-group bias: the tendency for people

## PERSISTENT GAP

Since 1985, the chances of winning a US National Institutes of Health grant have fallen overall, but the success rate for under-represented minorities has stayed below that of other races.



\*White and mixed-race. †Pacific Islander, Native Hawaiian, African American, Native American and Asian.

to favour other people and institutions that they know either personally or by reputation.

“I think this happens a lot in the granting world,” she says. “Is it that when you’re on a panel and you have to rate 15 grants from the top people in the field who have really produced a lot, from major schools, you just want to root for them because their skill and potential is so apparent, versus someone who isn’t from that world?”

Cardiologist Hannah Valantine, who became

the NIH’s first chief officer for scientific-workforce diversity in 2014, says that the agency is focused on demonstrating the benefits of diversity and how to achieve it. She adds that in response to Kington’s 2011 paper, the NIH has allocated more than \$500 million to programmes to evaluate how to attract, mentor and retain minority researchers. The agency is also studying biases that might affect peer review, and is interested in gathering data on whether a diverse workforce improves science. Although diversity benefits businesses and individual scientific investigators, it has not been shown to broaden the scope of research, says Valantine.

“We can move forward with a premise that the diversity of scientists themselves is important,” she says. “But it behooves us as scientists to get the evidence that the diversity of scientists makes a difference to the output.” ■ [SEE EDITORIAL P.275](#)

## CLARIFICATION

The News story ‘Mega science prize split between more than 1,000 physicists’ (*Nature* **527**, 145; 2015) did not reflect Göran Hansson’s current role in the Nobel system. He is secretary-general of the Swedish Academy of Sciences, the body that awards the Nobel prizes in physics and chemistry.