NEWS IN FOCUS

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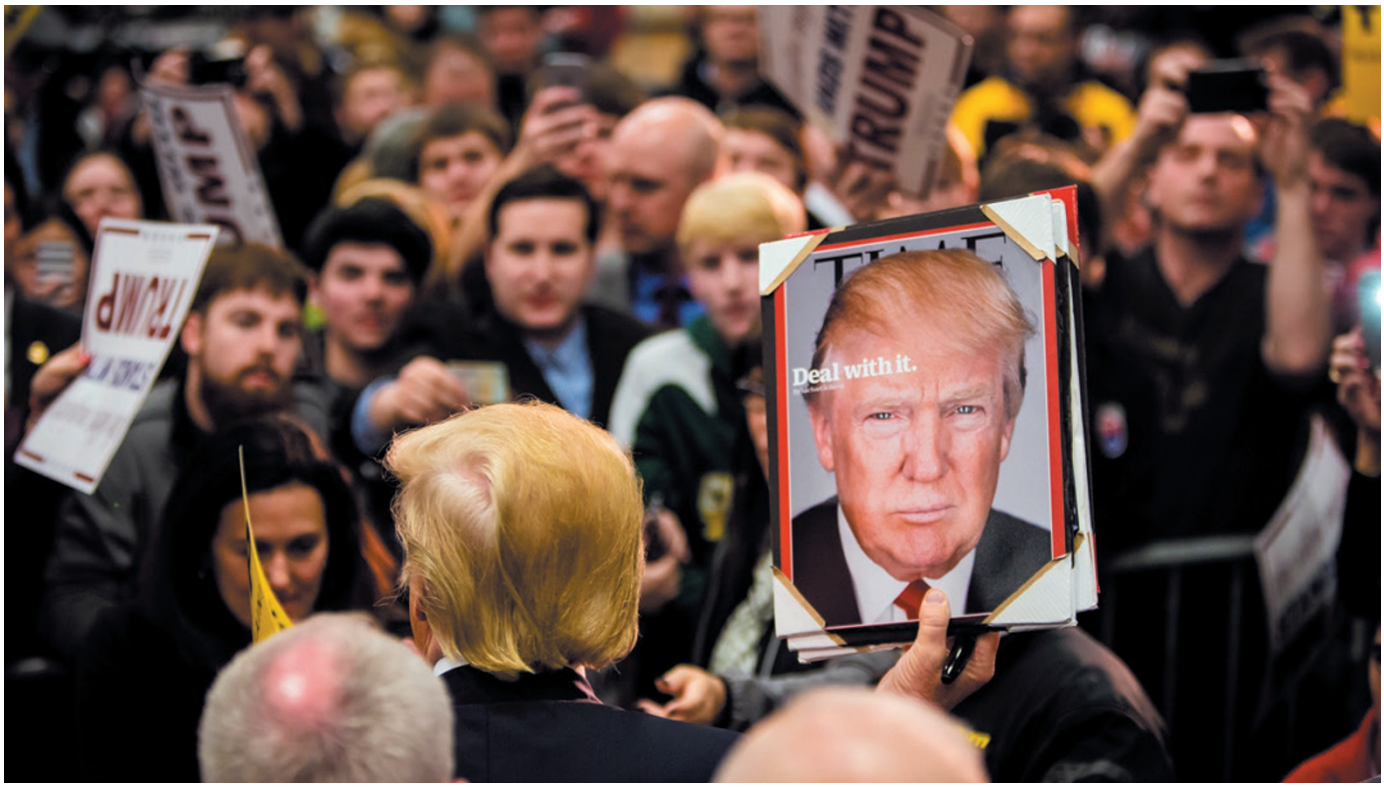

US Republican presidential candidate Donald Trump has proposed building a wall between the United States and Mexico.

POLITICS

Trump's immigration stance stokes fears for science

Rhetoric in US presidential campaign concerns researchers — particularly Muslims.

BY HEIDI LEDFORD

Razi Nalim has lived in the United States for 30 years. An engineer at Indiana University–Purdue University Indianapolis, he often travels around the world to recruit science and engineering students to his university. But last week, on the cusp of a recruitment trip to India, he hesitated when asked whether he would still encourage foreign, Muslim students to work or study in the United States.

"I would still say the opportunity for doing cutting-edge science here is unmatched," said Nalim, who is Muslim. "Where I think I would caution people to think more carefully is longer term: where would they want to live and raise a family? That's a harder question to answer."

For Nalim and others, the roots of such concerns are apparent. In December, US presidential candidate Donald Trump, who has campaigned against immigration, boasted that he would ban Muslims from entering the country if elected. (On 30 March, Trump — now the Republican front runner — said that he would make exceptions for some Muslims, notably his wealthy Muslim friends.)

Science advocates worry that Trump's broader anti-immigration stance could pose a threat to US research dominance. Roughly 5% of all students in the United States hail from other countries — including more than 380,000 people studying science, engineering, technology or mathematics. "We've always been a nation which has welcomed scientific brainpower from other countries," says Mary Woolley, president of Research!America, a ▶

science-advocacy group in Alexandria, Virginia. "We don't want that to turn around now."

Scientific issues have scarcely been mentioned on the campaign trail so far. Hillary Clinton, the Democratic front runner, has pledged to boost support for research into Alzheimer's disease, and has pushed back against Trump's anti-immigration and anti-Muslim stance. When she was a senator, Clinton backed health and research-related bills, and as first lady to former president Bill Clinton, she advocated for research on women's health.

Trump is a wealthy real-estate mogul with no political legacy to mine for clues as to his scientific opinions. In the course of the campaign, he has linked autism to childhood vaccines, and dismissed climate change. ("It's called weather," he said.) In October, conservative radio host Michael Savage suggested on air that if elected, Trump should appoint him as head of the US National Institutes of Health (NIH). "Well, you know you'd get common sense if that were the case, that I can tell you," Trump replied, during the light-hearted conversation. "Because I hear so much about the NIH, and it's terrible."

With little more than this to go on, advocates of science funding are worried. "It feels like there's a lot of cynicism toward science and scientists, and that's concerning," says Benjamin Corb, public-affairs director at the American Society for Biochemistry and Molecular Biology in Rockville, Maryland.

Trump's position on immigration is clearer. He frequently boasts that if elected, he would build a wall along the border with Mexico — and force Mexico to pay for it — which has earned him both supporters and derision. A President Trump could bode ill for long-running efforts to boost the number of foreign professionals working in the United States on visas for highly skilled workers, known as H-1Bs. But Trump's statements regarding H-1B visas have been difficult to parse. At times, he has advocated bringing skilled workers into the country; at others, he has said that the H-1B programme is too often abused and should be restricted.

"There's a lot of cynicism toward science and scientists."

Such statements worry Brad Hayes, a computer scientist at the Massachusetts Institute of Technology in Cambridge. Hayes is an US citizen, but says that some of his most outstanding colleagues are not. "A lot of them want to end up here after they get their PhDs, but now that's in doubt," he says. "We absolutely want these people to stay. If they get lumped in with this 'close our borders, keep everybody out', we're doing ourselves a disservice."

Hayes inadvertently cast a spotlight on the simplicity of Trump's rhetoric when he decided to use a neural network to model Trump's noticeably repetitive and simplistic speech patterns. He has been posting the results — computer-generated parody quotes based on Trump's campaign speeches — on Twitter using the handle @DeepDrumpf. (Trump's ancestral name, Drumpf, was changed by the family several generations ago.)

"We're going to build the wall," says one tweet, in reference to Trump's Mexico plan. Hayes says that the project was only meant to be fun, but it ended up making a point. "A lot of the rhetoric that's being used is fairly content-light."

But that rhetoric is having an effect, says Ehab Abouheif, a developmental biologist at McGill University in Montreal, Canada, who is Muslim. On a recent trip to be interviewed for a position in the United States, recruiters' "constant question was, 'Are you really sure you would want to come?'" he says. "My scientist colleagues are really scared."

To Abouheif, who fondly remembers completing his PhD and his postdoc in the United States, the current climate is surreal. "If you are trying to stop Muslims from coming in, it means that the ones who are there already are not going to feel comfortable either," he says. "It would be a shame to alienate this big swathe of society." ■

COSMOLOGY

Controversial dark-matter claim faces ultimate test

Multiple teams finally have the material they need to repeat enigmatic experiment.

BY DAVIDE CASTELVECCHI

It is the elephant in the room for dark-matter research: a claimed detection that is hard to believe, impossible to confirm and surprisingly difficult to explain away. Now, four instruments that will use the same type of detector as the collaboration behind the claim are in the works or poised to go online. Within three years, the experiments will be able to either confirm the existence of dark matter — or rule the claim out once and for all, say the physicists who work on them.

"This will get resolved," says Frank Calaprice of Princeton University in New Jersey, who leads one of the efforts.

The original claim comes from the DAMA collaboration, whose detector sits in a laboratory deep under the Gran Sasso Massif, east of Rome. For more than a decade, it has reported overwhelming evidence[1] for dark matter, an invisible substance thought to bind galaxies together through its gravitational attraction. The first of the new detectors to go online, in South Korea, is due to start taking data in a few weeks. The others will follow over the next few years in Spain, Australia and, again, Gran Sasso. All will use sodium iodide crystals to detect dark matter, which no full-scale experiment apart from DAMA's has done previously.

Scientists have substantial evidence that dark matter exists and is at least five times as abundant as ordinary matter. But its nature remains a mystery. The leading hypothesis is that at least some of its mass is composed of weakly interacting massive particles (WIMPs), which on Earth should occasionally bump into an atomic nucleus.

DAMA's sodium iodide crystals should produce a flash of light if this happens in the detector. And although natural radioactivity also produces such flashes, DAMA's claim to have detected WIMPs, first made in 1998, rests on the fact that the number of flashes produced per day has varied with the seasons.

This, they say, is exactly what is expected if the signal is produced by WIMPs that rain down on Earth as the Solar System moves through the Milky Way's dark-matter halo[2]. In this scenario, the number of particles crossing Earth should peak when the planet's orbital motion lines up with that of the Sun, in early June, and should hit a low when its motion works against the Sun's, in early December.

There is one big problem. "If it's really dark matter, many other experiments should have seen it already," says Thomas Schwetz-Mangold, a theoretical physicist at the Karlsruhe Institute of Technology in Germany — and none has. But at the same time, all attempts to