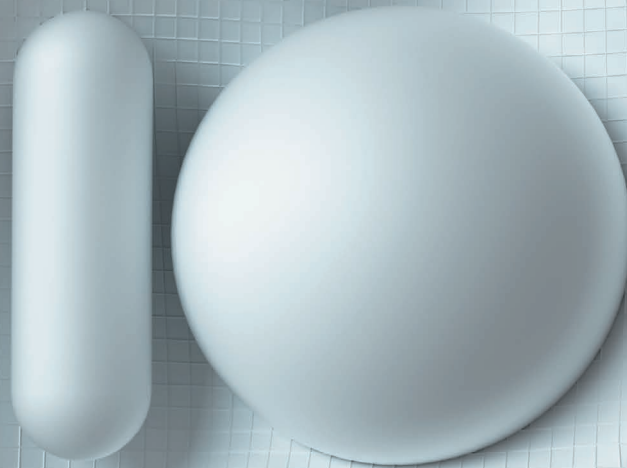


# TEN PEOPLE WHO MATTERED THIS YEAR



## NATURE'S 10

**GABRIELA GONZALEZ / DEMIS HASSABIS / TERRY HUGHES**

**GUUS VELDERS / CELINA M. TURCHI / ALEXANDRA ELBAKYAN**

**JOHN ZHANG / KEVIN ESVELT / GUILLEM ANGLADA-ESCODÉ / ELENA LONG**

**366 DAYS:**  
*the year in science*



GABRIELA  
GONZALEZ

# GRAVITY SPY

*A physicist helped to catch the first direct signs of long-sought gravitational waves.*

BY DAVIDE CASTELVECCHI

**A** year ago, Gabriela Gonzalez was struggling to contain the biggest secret of her life. Two giant detectors in the United States had picked up signs of gravitational waves — wrinkles in space-time imagined by Albert Einstein but never before directly witnessed. It was Gonzalez's job to help lead more than 1,000 scientists in their careful efforts to verify the discovery before announcing it to the public.

News like that doesn't stay under wraps for long, but the discovery was so momentous that the research team took nearly five months to analyse data from the two Laser Interferometer Gravitational-Wave Observatory (LIGO) detectors in Washington state and Louisiana. As spokesperson for the LIGO Scientific Collaboration, Gonzalez was one of the key people coordinating the analysis by groups scattered around the world, including researchers at the Virgo interferometer near Pisa, Italy, which pools its data with LIGO.

The role of shepherding this massive effort made use of Gonzalez's multidimensional talents. Most physicists know early on whether they will be a theorist or an experimentalist. But Gonzalez started her graduate studies as a theoretical physicist and only later switched to experimental work, when she showed uncommon aptitude. "It was the thing that set her up as a first-class scientist," says Rainer Weiss, a physicist at the Massachusetts Institute of Technology in Cambridge and one of the founders of LIGO.

Throughout her career, Gonzalez has done "a bit of everything" at LIGO, she says. For a while, she took on the crucial task of diagnosing

the performance of the interferometers to make sure that they achieved unparalleled sensitivity — which is now enough to detect length changes in the 4-kilometre-long arms of the interferometers to within one part in  $10^{21}$ , roughly equivalent to the width of DNA compared with the orbit of Saturn. She has helped to lead the teams that analyse the data. And she nudged gravitational-wave researchers and dozens of their colleagues in conventional astronomy into signing pacts of cooperation. Together, they will look for phenomena that emit both gravitational and electromagnetic waves, in what has been called the coming age of multimessenger astronomy.

WILLIAM WIDMER/REDX/EYEVINE

In the hectic months before announcing the LIGO discovery, Gonzalez and her colleagues struggled to make sure that they had iron-clad evidence. They knew that history had not been kind to those who had previously reported gravitational waves. Most recently, in early 2015, an international collaboration had to retract its claims that a telescope at the South Pole had discovered indirect signs of the long-sought vibrations.

To add to the pressure on the LIGO team, rumours of a discovery began to leak within a week of the initial finding, and reporters started to call. Throughout the long analysis period, Gonzalez says, she never made an important decision without consulting colleagues. But others laud her leadership. "What Gaby did is, she managed to get us through this period," Weiss says.

Gonzalez is based at Louisiana State University in Baton Rouge, close to the LIGO interferometer in Livingston. In 2008, she became the first woman to receive a full professorship in her department. She says that she has never experienced outright sexual harassment or discrimination during her career, but "I had to prove myself perhaps more than other people".

Gonzalez has said that after her current term as LIGO spokesperson ends in March 2017, she will not run again. She plans to go back to full-time research. The field of science she helped to create — gravitational-wave astronomy — has just seen its dawn. "It has always been a fun ride. And now it's even better." ■

# MIND CRAFTER

*An AI developer beat one of the best at Go. Next up, solve global problems.*

BY ELIZABETH GIBNEY

For veteran gamer Demis Hassabis, March brought the toughest match of his life — and he wasn't even playing. Hassabis had to watch from the sidelines as his team's creation, the computer program AlphaGo, took on Lee Sedol, a top-ranked champion in the strategy game Go. The computer won, marking a huge victory for the field of artificial intelligence (AI) and another in a series of triumphs for Hassabis.

As co-founder of DeepMind, the London-based firm that developed AlphaGo, Hassabis was both elated and relieved. "It felt like our moonshot, and it was successful," he says.

But the win was about much more than Go. Hassabis wanted to show the world the power of machine-learning techniques, which he hopes to someday harness in a human-like, general AI capable of solving complex global problems.

Hassabis had sketched this vision out as a precocious youth. A chess prodigy, he began designing innovative, multimillion-selling video games while in his teens and

started his own company in his early 20s. After completing a PhD in cognitive neuroscience, he founded DeepMind in 2010. Google bought the company 4 years later for a reported £400 million (more than US\$650 million at the time).

At the firm, researchers apply inspiration from neuroscience to eye-catching AI tasks, from synthesizing speech to navigating the London Underground. Each algorithm builds complexity on to the last, says Hassabis, and weaves in capabilities that have historically been developed separately in AI. DeepMind AIs have gone from learning how to see, and acting on that vision, to using it to plan and reason. In terms of real-world problem-solving, the team used machine learning to cut power usage in Google's data centres by 15%, something that Hassabis hopes to apply on a much grander scale.

Although the company's researchers do publish, their work-in-progress is kept under wraps, which irks some academics. And some data-privacy advocates have concerns over Google DeepMind's plans to collaborate with the UK National Health Service. Scientists, however, have been flocking to work at the company.

In person, Hassabis is unassuming but eager. He has a knack for swaying others to his passion, says Eleanor Maguire, his former PhD supervisor at University College London. "Once he gets talking about something he's interested in, it's infectious," she says. Fitting research alongside running the company now means saving science for the small hours of the morning, something Hassabis says he doesn't mind. "It's a very important mission that we're on, and I think it's worth the sacrifice." ■



DEMIS  
HASSABIS



TERRY HUGHES

## REEF SENTINEL

*A coral researcher sounded the alarm over massive bleaching at the Great Barrier Reef.*

BY DANIEL CRESSEY

**W**hen Terry Hughes flew over the Great Barrier Reef in March, his heart sank at the sight of telltale pale patches just below the surface, where corals were dead or dying.

Hughes, director of the Australian Research Council's (ARC's) Centre of Excellence for Coral Reef Studies in Townsville, says that he and his students wept after looking at the aerial surveys of the damage. The bleaching hit nearly all of the reef, with initial surveys showing 81% of the northern section suffering severely. It was the most devastating bleaching ever documented on the Great Barrier Reef — and part of a wider event that was harming corals across the Pacific.

The trigger for this year's coral troubles in the Pacific was a strong El Niño warming pattern in the tropical part of that ocean. Abnormally high water temperatures prompt corals to expel the symbiotic zooxanthellae algae that provide them with much of their food — and their colour. Some corals can recover after bleaching, but others die. Follow-up studies in October and November found that 67% of shallow-water corals in the 700-kilometre northern section of the Great Barrier Reef had died.

When the massive El Niño reared up in the Pacific in 2015, Australian researchers feared that the country's reefs could be in danger. So Hughes, one of the world's leading coral researchers, assembled a task force ready

ANDREW RANKIN FOR NATURE

## COOLING AGENT

*An atmospheric chemist laid the foundation for an international climate agreement.*

BY JEFF TOLLEFSON

**I**t isn't often that atmospheric chemists get to help save the world, but Guus Velders had his chance in October. He was attending international negotiations in Kigali, Rwanda, that were seeking to phase out production and use of hydrofluorocarbons (HFCs), extremely potent greenhouse gases commonly used in air conditioners.

Most nations had agreed on an aggressive timetable to begin eliminating the compounds, but India and a handful of other countries wanted an extra four years. After plugging the numbers into a model on his laptop computer, Velders informed negotiators that this particular concession would have little impact on the planet.

That and his earlier work helped to smooth the way for a widely hailed global accord, which was signed on 15 October. Velders, a soft-spoken researcher at the National Institute for Public Health and the

Environment in Bilthoven, the Netherlands, is proud of the part he played. "I've never been involved in a process that leads to a global agreement on climate before," he says.

It was no coincidence, however. Colleagues say that Velders has become the world's expert on HFC emissions, and that nobody else could have provided such rapid analysis in Kigali. He is part of a community of scientists that has helped to refashion the 1987 Montreal Protocol — an international agreement designed to protect the stratospheric ozone layer — into a tool with which to fight global warming.

The refrigerants that fall within the scope of the protocol are also powerful greenhouse gases, and Velders' team showed that the Montreal agreement actually did more to control global temperatures than did the 1997 Kyoto Protocol climate treaty. More recently, the team projected how much warming HFCs were likely to cause over the twenty-first century. That helped to set the stage for the agreement on HFCs, which was reached as an amendment to the Montreal Protocol.

"The Velders team always answered the right questions at the right time," says Durwood Zaelke, president of the Institute for Governance & Sustainable Development, an advocacy group in Washington DC. "It's safe to say that we wouldn't have this agreement without them."

Now it's back to the drawing board for Velders' team. Their scenario about how HFC emissions would grow over time was rendered obsolete by the new agreement to ban them. That's the kind of intellectual setback that Velders heartily accepts. ■

to survey the reef if bleaching occurred. The group eventually expanded to 300 scientists. “We put together a very detailed research plan, hoping of course that it wouldn’t happen,” he says.

Hughes is based close to the central portion of the Great Barrier Reef. After leading the initial surveys, he became the de facto spokesperson on the catastrophe. At the height of media interest in the bleaching, Hughes did 35 interviews in one day.

“In Australia, even people who have never been to the Great Barrier Reef and might never go there regard it as an icon,” says Bob Pressey, a fellow researcher at the ARC centre.

The crisis on the reef defied some rules. Conventional thinking on bleaching events, says Hughes, is that corals die slowly from starvation after their zooxanthellae leave. But this year, water temperatures were so high that “we saw a lot of corals die before the starvation kicked in. They actually cooked.”

Corals throughout the world have struggled in the past couple of years, as global temperatures have repeatedly hit record highs. In October 2015, the US National Oceanic and Atmospheric Administration declared that a global bleaching event was happening as coral reefs in Hawaii, Papua New Guinea and the Maldives began to succumb.

This year, the bleaching spread to Australia, Japan and other parts of the Pacific. Researchers say that, as climate change drives up baseline temperatures, bleaching will afflict reefs more frequently. Under some scenarios, this could happen so often that most corals can no longer survive.

Hughes is not ready to give up on the Great Barrier Reef just yet. But the recent bleaching has left corals in a weakened state, prone to attacks from pathogens and predators. Another bleaching event in the near future could bring further damage. “The message to people,” he says, “should be we’ve got a closing window of opportunity to deal with climate change.” ■



GUUS  
VELDERS



CELINA M.  
TURCHI

## ZIKA DETECTIVE

*A physician raced to make sense of a medical mystery in northeast Brazil.*

BY DECLAN BUTLER

**F**ears about the Zika virus spread across the globe in 2016, and the epicentre of concern was Brazil, where the epidemic first appeared in the Americas. Some researchers even called for postponing the Olympic Games scheduled for Rio de Janeiro in August that year. But away from the media frenzy, Celina Maria Turchi Martelli battled on the front lines in northeast Brazil to make sense of the medical mystery there.

Turchi, a physician and infectious-disease expert, has had her life turned upside down by Zika since September 2015. That’s when the ministry of health asked her to investigate a sharp rise in reports of babies born with abnormally small heads and brains, a condition known as microcephaly, in her home state of Pernambuco. She quickly became convinced that the country was facing a public-health emergency. “Not even in my worst nightmare as an epidemiologist had I imagined a microcephaly neonate epidemic,” she says.

Turchi, who is based at the Aggeu Magalhães Research Center in Recife, immediately contacted scientists across the globe for help. She formed a networked task force of epidemiologists, infectious-diseases experts, paediatricians, neurologists and reproductive biologists. The challenges were formidable, says Turchi: there were no reliable lab tests for Zika, and there was no consensus on a case definition of microcephaly. But the intense networking paid off, and Turchi and her colleagues eventually generated enough evidence to demonstrate a link between the condition and infection with Zika in the first trimester of pregnancy.

Still, the mysteries are far from solved, says Turchi. Although Zika has spread across the Americas, the expected explosion in the number of microcephaly cases outside northeast Brazil has not materialized. Turchi and her task force are now trying to work out why. When she started going into the hospitals of Recife to investigate the outbreak, Turchi says, she had to innovate. “There was no book to follow.” Now, she and her colleagues are writing that book. ■



# PAPER PIRATE

*The founder of an illegal hub for paywalled papers has attracted litigation and acclaim.*

BY RICHARD VAN NOORDEN

It took Alexandra Elbakyan just a few years to go from information-technology student to famous fugitive.

In 2009, when she was a graduate student working on her final-year research project in Almaty, Kazakhstan, Elbakyan became frustrated at being unable to read many scholarly papers because she couldn't afford them. So she learnt how to circumvent publishers' paywalls.

Her skills were soon in demand. Elbakyan saw scientists on web forums asking for papers they couldn't access — and she was happy to oblige. "I got thanked many times for sending paywalled papers," she says. In 2011, she decided to automate the process and founded Sci-Hub, a pirate website that grabs copies of research papers from behind paywalls and serves them up to anyone who asks. This year, interest in Sci-Hub exploded as mainstream media cottoned on to it and usage soared. According to Elbakyan's figures, the site now hosts around 60 million papers and is likely to serve up more than 75 million downloads in 2016 — up from 42 million last year and, by one estimate, encompassing around 3% of all downloads from science publishers worldwide.

It is copyright-breaking on a grand scale — and has brought Elbakyan praise, criticism and a lawsuit. Few people support the fact that she acted illegally, but many see Sci-Hub as advancing the cause of the open-access movement, which holds that papers should be made (legally) free to read and reuse. "What she did is nothing short of awesome," says Michael Eisen,

AP/NEET JOLLY/FICKR/CC BY 2.0

# FERTILITY REBEL

*A physician jump-started debate over a controversial IVF procedure.*

BY SARA REARDON

Shock, anger, scepticism and congratulations. Those were some of the reactions that fertility specialist John Zhang triggered in the scientific community in September, when he announced that a controversial technique that mixes DNA from three people had been used to produce a healthy baby boy.

This kind of technique is intended to prevent children from inheriting disorders involving mitochondria — the cellular structures that produce energy. But ethical and safety concerns have prompted the United States to ban such procedures without a permit. Zhang, who works at New Hope Fertility Center in New York City, performed the technique at the company's clinic in Mexico.

Critics saw this as an attempt to evade regulation, and complained that he had announced the work at a conference rather than in a publication.

But Zhang brushes aside those objections. "The most important is to have a live-birth baby, not to tell the whole world," he says.

Zhang has a habit of pushing scientific and ethical boundaries. In the 1990s, he worked with reproductive endocrinologist Jamie Grifo at the New York University Langone Medical Center to develop a version of the technique that Zhang used this year. The approach was designed to help older women to become pregnant by replacing their ageing mitochondria with those from younger eggs. No successful pregnancies resulted.

When US regulators began restricting this technique in 2001, Zhang and his collaborators in China took over the work. In 2003, Zhang's team created and implanted multiple embryos into a woman. After all the fetuses were miscarried, China banned the technique as well.

Grifo and some others applaud Zhang's latest work. "I think it's a great thing it was finally done," says Grifo. But others have criticized the New Hope team. "A lot of things they did were completely unsafe," such as infusing the donor's egg with a drug that could cause chromosomal abnormalities, says Shoukhrat Mitalipov, a stem-cell scientist at Oregon Health & Science University in Portland.

Zhang is undeterred. He says that plenty of other families at risk of mitochondrial disease have expressed interest in his procedure, and he hopes to perform it in other countries. "Five to ten years from today, people will look at it and say, 'Why were we all so stupid, why were we against it?'" he says. "I think you have to show the benefit to mankind." ■

a biologist and open-access supporter at the University of California, Berkeley. “Lack of access to the scientific literature is a massive injustice, and she fixed it with one fell swoop.”

For the first few years of its existence, the site flew under the radar — but eventually it grew too big for subscription publishers to ignore. In 2015, the Dutch company Elsevier, supported by the wider publishing industry, brought a US lawsuit against Elbakyan on the basis of copyright infringement and hacking. If Elbakyan loses, she risks having to pay many millions of dollars in damages, and potentially spending time in jail. (For that reason, Elbakyan does not disclose her current location and she was interviewed for this article by encrypted e-mail and messaging.) In 2015, a US judge ordered Sci-Hub to be shut down, but the site popped up on other domains.

Elbakyan has found her name splashed across newspapers, and says she typically gets a hundred supportive messages a week, some with financial donations. She says she feels a moral responsibility to keep her website afloat because of the users who need it to continue their work. “Is there anything wrong or shameful in running a research-access website such as Sci-Hub? I think no, therefore I can be open about my activities,” she says.

Critics and supporters alike think that the site will have a lasting impact, even if it does not last. “The future is universal open access,” says Heather Piwowar, a co-founder of Impactstory, a non-profit firm incorporated in Carrboro, North Carolina, which helps scientists track the impact of their online output. “But we suspect and hope that Sci-Hub is currently filling toll-access publishers with roaring, existential panic. Because in many cases that’s the only thing that’s going to make them actually do the right thing and move to open-access models.”

Whether or not that’s true, Elbakyan says she will keep building Sci-Hub — in particular, to expand its corpus of older manuscripts — while studying for a master’s degree in the history of science. “I maintain the website myself, but if I’m prevented, somebody else can take over the job,” she says. ■



JOHN ZHANG

KEVIN  
ESVELT

## CRISPR CAUTIONARY

*A budding biologist put gene-drive ethics before experiments.*

BY HEIDI LEDFORD

It was a trip to the Galapagos Islands at the age of ten that first whetted Kevin Esvelt’s appetite for tinkering with evolution. As he stood marvelling at the iguanas, birds and sheer diversity of the place that had inspired Charles Darwin, Esvelt vowed to understand evolution — and improve on it. “I wanted to learn more about how these creatures came to be,” he says. “And, frankly, I wanted to make more of my own.”

Today, Esvelt is still a precocious biologist. Less than a year after launching his lab at the Massachusetts Institute of Technology Media Lab in Cambridge, he has already made a name for himself as one of the pioneers of a controversial technique called a gene drive. His method harnesses CRISPR–Cas9 gene editing to circumvent evolution, forcing a gene to spread rapidly through a population. It could be used to wipe out mosquito-borne diseases such as malaria or eradicate invasive species. But it could also set off unintended ecological chain reactions, or be used to create a biological weapon.

The idea of CRISPR gene drives hit Esvelt when he was tinkering with the Cas9 enzyme in 2013. “I had one day of absolute, ecstatic glee: this is what’s going to let us get rid of malaria,” says Esvelt. “And then I thought, ‘Wait a minute.’”

Following that thought, Esvelt has worked to ensure that ethics comes before experiments. He first sounded the alarm in 2014, calling for public discussion about gene drives even before he had demonstrated that a CRISPR–Cas9 gene drive could work (K. A. Oye *et al. Science* **345**, 626–628 (2014); K. M. Esvelt *et al. eLife* **3**, e03401; 2014). Since then, he and his colleagues have shown how gene drives might be made safer, and how they could be reversed (J. E. DiCarlo *et al. Nature Biotechnol.* **33**, 1250–1255; 2015).

This year, his advocacy has begun to bear fruit. Researchers and policymakers worldwide have been discussing the technology, and a report from the US National Academies of Sciences, Engineering, and Medicine urged that gene-drive research proceed, but cautiously. Omar Akbari, who studies gene drives at the University of California, Riverside, believes Esvelt’s outreach has focused public attention — and attracted funding — for a nascent technology at just the right time. “I attribute that to Kevin,” says Akbari. “It’s difficult for a scientist to do what he’s done.” ■



## PLANET HUNTER

*An astronomer detected the nearest known planet outside the Solar System.*

BY ALEXANDRA WITZE

**G**uillem Anglada-Escudé wasn't surprised early this year when evidence of an alien world rippled across his computer screen. He had been almost certain that an Earth-sized planet orbited Proxima Centauri, the star nearest the Sun at just 1.3 parsecs (4.2 light years) away.

To Anglada, an astronomer at Queen Mary University of London, the discovery came as more of a relief than a shock. He and his colleagues had been working feverishly to stake their claim in the competitive world of planet hunting, and the Proxima find confirmed that they were on the right path. "We made it," he says.

To the rest of the world, the discovery of the closest known exoplanet to Earth stoked the public imagination. It raised questions about whether life might exist in our cosmic backyard, and whether astronomers might be able to detect it.

These are the kinds of question that got Anglada into planet hunting in the first place. A science-fiction fan while growing up near Barcelona, Spain, he got his astronomical start doing data simulations for Gaia, a European Space Agency mission to map 1 billion stars. Later, he turned his data-crunching skills to exoplanets. He developed a method for extracting faint planetary signals from data gathered by the world's premier ground-based planet-hunting instrument, the High Accuracy Radial velocity Planet Searcher (HARPS) at

BRIAN DAVID STEVENS FOR NATURE

## DIVERSITY TRAILBLAZER

*A transgender physicist paved the way for greater acceptance of minority groups.*

BY ELIZABETH GIBNEY

**P**hysicists can be open to seeing the world in new ways, but they need to see the data first. This posed a problem for Elena Long, a nuclear physicist who has fought for her field to be more inclusive of people from sexual and gender minorities. "We didn't have any data, because people considered it too offensive to ask if we exist. It was a catch-22."

Long was one of the architects of a first-of-its-kind survey run by the American Physical Society (APS), charting the experiences of physicists who are lesbian, gay, bisexual, transgender or from another sexual or gender minority (LGBT).

The findings, presented to a packed room at the APS March meeting this year, were stark. Of the 324 scientists who responded, more than one in five reported having been excluded, intimidated or harassed at work in the previous year. Transgender physicists reported the highest incidence of discrimination. Long, who is transgender herself, was unsurprised. In 2009, she began work for her PhD at the Thomas Jefferson National Accelerator Facility in Newport News, Virginia, which lacked trans-inclusive employment protections and health-care benefits. She felt isolated without LGBT support networks. "I loved the work I was doing, and I loved the research. But it was rough," she says.

So she founded the LGBT+ Physicists support group and began pushing for greater recognition at the APS, which eventually created a committee to collect data on LGBT discrimination. Many physicists, she says, could not even understand the need for such a study. Thanks to Long and her colleagues, physics is emerging as exemplary in its approach to



## Ones to watch

# 2017

### CORI BARGMANN

SCIENCE PRESIDENT, CHAN ZUCKERBERG INITIATIVE

Bargmann is steering the research operations of a US\$3-billion effort by the philanthropic organization to cure, prevent or manage all disease by 2100.

### ROBERT FEIDENHANS'L

CHAIRMAN, EUROPEAN XFEL

As the new head of the world's most powerful X-ray free-electron laser, Feidenhans'l will guide the €1.2-billion (US\$1.3-billion) facility during its ramp up to becoming fully operational by mid-year.

### JEF BOEKE

CO-LEADER, HUMAN GENOME PROJECT-WRITE

Boeke is a director of an ambitious effort that is seeking to synthesize the human genome. He and others are already close to making a yeast genome.

### WU WEIREN

CHIEF DESIGNER, CHINA LUNAR PROGRAMME

China's plans call for launching the Chang'e-5 mission in the latter half of 2017 to collect the first lunar rock samples to be brought back to Earth since the 1970s.

### MARCIA MCNUTT

PRESIDENT, NATIONAL ACADEMY OF SCIENCES

With her experience in President Barack Obama's cabinet, McNutt will have a central role in representing US science during Donald Trump's presidency.

the European Southern Observatory in La Silla, Chile.

"Guillem has a natural talent of seeing the big picture where others see details," says Mikko Tuomi, an astronomer at the University of Hertfordshire in Hatfield, UK, and a collaborator of Anglada's.

But Anglada soon ran straight into high academic drama, tussling with other researchers over who deserved credit for discovering a planet bigger than Earth and smaller than Neptune orbiting the star Gliese 667C. "I could have left the field and done something else," he says. "But I took the decision of following it very aggressively."

He dived into HARPS data, publishing paper after paper on the planetary signals he discovered amid the background noise in the data. And then, as if to push back on all the secrecy and competition, Anglada launched a very public hunt for a planet orbiting Proxima.

He put together a team and got observing time on HARPS, as well as other telescopes that could double-check whether any promising evidence that they found was caused by stellar activity, which can mimic the signs of a planet (a problem that plagues many exoplanet claims). The researchers put nearly all their details on an outreach website and social-media accounts. Being so transparent "didn't seem dangerous at all", Anglada says. "We had a feeling nobody else would do this."

Within days, they confirmed that the planet was there; within weeks, they submitted a manuscript detailing their discovery. The planet, called

Proxima b, is at least 1.3 times the mass of Earth and orbits Proxima every 11.2 days.

Although it is close to its star, the world is within the 'habitable zone', where liquid water could exist on its surface. That makes it not only the closest known exoplanet of the 3,500-plus confirmed so far, but also a place where otherworldly life could thrive — a double bonus for researchers and science-fiction fans alike.

Just before the paper was published in *Nature* in August (G. Anglada-Escudé *et al.* *Nature* **536**, 437–440; 2016), Anglada e-mailed British sci-fi writer Stephen Baxter, author of the novel *Proxima* (Gollancz, 2013). They corresponded about what life might be like on a world with one hemisphere permanently facing a flaring star, as happens at Proxima.

People could eventually get a close-up look at Proxima b. The Breakthrough Starshot initiative aims to send fleets of tiny laser-propelled spacecraft to a nearby star, and it may target Proxima as its closest and best option.

Anglada's next step is to see whether Proxima b transits, or passes across the face of its star as seen from Earth. The chances are low, but if it does, then much more science can be gleaned when Proxima's light passes through the planet's atmosphere, if it has one.

And if the transit does not happen? Then Anglada may be off, to tease out some other signal of another world. ■

KANDICE CARTER

these issues, says Samuel Brinton, a board member of the society Out in Science, Technology, Engineering and Mathematics. "We are literally using their work to start changes for the better in multiple fields," he says. The APS accepted the recommendations made in the March report. And in August, a major APS division voted to move its 2018 meeting out of Charlotte, North Carolina, in response to a state law that forces people to use public toilets that match the gender they were assigned at birth.

Long has meanwhile won two young-scientist awards offered by her lab and become a co-leader on two new accelerator experiments. "I've known a lot of postdocs who've done voluntary work, and usually it compromises their science," says Karl Slifer, Long's postdoctoral supervisor at the University of New Hampshire in Durham. "I've never seen that in Elena." (Long attributes her strict time management to a computer program she designed that charts every hour of her day.)

Now Long is helping to set up an APS membership group focusing on diversity and inclusion, which she hopes will make it easier for scientists in other minority groups to flourish. "I'm sure there are other people facing problems in the field I never thought about," she says. "I don't want them to wait seven years to get to a place where they can have a voice." ■

