



The Parker Solar Probe will travel seven times closer to the Sun's surface than any previous spacecraft.

JHU/APL

Space physicists have dreamt of a mission that would fly through the solar corona, or at least travel inside the orbit of Mercury, the innermost planet, since 1958. In the same year, Eugene Parker — the physicist at the University of Chicago in Illinois for whom the probe is named — first proposed the existence of the solar wind².

After decades on the drawing board, the mission is finally approaching launch. Eight weeks after lift-off, it will fly past Venus, using the planet's gravity to slow down and slip into a tighter orbit around the Sun. Five weeks after that, on 3 November, the probe will make its first close approach — at more than 24 million

kilometres, or 35 times the solar radius, from its surface.

From there, the spacecraft will loop around the Sun, drawing gradually closer as it flies past Venus six more times. That trajectory will give the probe ample time to gather data, says Yanping Guo, an engineer at APL who designed the mission's trajectory.

Somewhere between the first close approach (at 35 solar radii) and its final ones (within 10 solar radii) the probe will encounter the Alfvén surface, a boundary at which the solar wind becomes supersonic. Inside the Alfvén surface, the Sun's magnetic field dominates; outside, the solar wind is more detached and

streams away on its own.

Crossing that boundary with a spacecraft will be similar, symbolically, to the moment when the Voyager 1 probe entered interstellar space in 2012, says Justin Kasper, a physicist at the University of Michigan in Ann Arbor who has studied the Alfvén transition³. The moment will mark humanity's passage to another realm in the Solar System. "I'm confident that something special will happen," he says.

The Parker Solar Probe bristles with an array of instruments designed to sample the corona directly. Protecting them is a 2.4-metre-wide heat shield made of 11-centimetre-thick carbon foam sandwiched between layers of carbon composite. It can withstand temperatures of nearly 1,400 °C. The solar panels that power the spacecraft will be kept cool with a water-tubing system similar to a car's radiator. During the searing conditions of close approach, most of the solar panels will fold back to shelter in the heat shield's shade.

Mission scientists hope that the Parker Solar Probe will kick off a new era of studying the Sun. In 2020, the European Space Agency plans to launch its Solar Orbiter spacecraft, which will study the Sun at higher latitudes and from a more distant point in space than the Parker Solar Probe will. Also by 2020, the Daniel K. Inouye Solar Telescope will come online in Hawaii, where it will make daily maps of the solar corona.

For his part, the 91-year-old Parker is looking forward to seeing the waves and turbulence in the solar wind — which he predicted — measured by the probe that bears his name. "I expect to find some surprises," he says. ■

1. Fox, N. J. *et al. Space Sci. Rev.* **204**, 7–48 (2016).

2. Parker, E. N. *Astrophys. J.* **128**, 664–676 (1958).

3. Kasper, J. C. *et al. Astrophys. J.* **849**, 126 (2017).

FUNDING

Philippines sweetens deal for scientists who return home

But some academics say more needs to be done to train and retain early-career researchers.

BY ANDREW SILVER

A renewed government effort to draw Filipino scientists back to the Philippines by paying them to set up their own research labs or teach has met with a mixed reception.

Some Filipino researchers applaud the goals of the effort. The government says it needs to bring research expertise back home to solve some of the country's most pressing problems, such as climate-change mitigation.

Others suggest that resources would be better directed to mentoring early-career scientists before they think about leaving. "If you want Filipino scientists, you grow them," says Vena Pearl Bongolan, an applied mathematician at the University of the Philippines Diliman in Quezon City.

An existing project designed to address the issue is the Balik Scientist Program, established in the 1970s. Since 1993, it has offered research grants for up to three years, as well as round-trip airfare and duty-free equipment imports,

to Filipino scientists willing to return home.

Last month, President Rodrigo Duterte signed a law that instructs the Department of Science and Technology to allocate more money to the Balik programme by adding benefits for returning scientists, such as a monthly housing allowance, medical insurance and assistance for researchers' children to attend schools of their choice. Between 2007 and April 2018, 207 scientists joined the Balik programme, some for stints of a couple of months and others for several years. ▶



The Philippine government wants to boost the number of agricultural scientists in the country.

► The programme cost 173 million Philippine pesos (US\$3.2 million) from 2007 to the end of 2017.

The department has not yet established exactly how the changes to the programme will work and how much extra money it will get. Several sectors are listed as high-priority recruitment areas, including space, energy, artificial intelligence and agriculture and food.

GROWING DIASPORA

In 2013, the Philippines had only 187.7 scientists per million people, one of the lowest densities of researchers in the region. The latest figures from the Department of Science and Technology estimate that the

number of Filipino science and technology workers who moved overseas jumped from 9,877 in 1998 to 26,917 in 2013.

The revamped Balik programme is part of a government plan to increase development in the country, which came into effect last year. The government aims to boost the scientific workforce to 300 researchers per million people by 2022.

Biologist Michael Velarde, a current Balik scientist at the University of the Philippines Diliman, says that the extra support for the programme is a good idea because the country needs more overseas-trained researchers to address challenges including preventing the spread of diseases such as Zika and studying

how climate change affects health.

And he thinks the added financial incentives will attract more talent back to the Philippines.

But Bongolan is frustrated that the country is paying to relocate scientists from abroad rather than offering more scholarships that encourage local students to pursue science at university.

She participated in the Balik programme in July 2008 after studying and working in the United States for a decade, and is sceptical about whether some participants are in the Philippines for long enough to contribute meaningful research and development.

The Department of Science and Technology did not respond to *Nature's* request for details on what participants had achieved. But a department spokesperson said each scientist sets goals for their time in the country, and that all participants so far have met their targets. A statement posted on the department's website last month noted that the Balik programme had "significantly contributed to the acceleration of the scientific, agro-industrial and economic development of the country".

Miguel Garcia, a Filipino neuroscience and economics PhD student at the University of Zurich in Switzerland, says that the Philippines needs more than money to lure researchers back from overseas. Scientists need access to the right facilities and other researchers in their discipline; these are lacking in his field, he says.

Garcia also thinks the government should be encouraging scientists of any nationality to work in the Philippines. "Why tie your research interests based on someone's nationality when the government could set up the kind of research it needs, and attract scientists — regardless of nationality — to do it?" he asks. ■

PUBLISHING

Mega-publisher cuts off German scientists

Negotiations with Elsevier have stalled over open access.

BY HOLLY ELSE

Elsevier last week stopped thousands of scientists in Germany from reading its recent journal articles, as a row escalated over the cost of a nationwide open-access agreement. The move comes just two weeks after researchers in Sweden lost access to the most recent Elsevier research papers, when negotiations on a contract there broke down over the same issue.

Negotiators in Germany and Elsevier now seem to be waiting for the other to blink, says Joseph Esposito, a publishing consultant in New York City. The highly public nature of the stand-off means that "any deal Elsevier does with them becomes the de facto deal for the entire world", he adds.

Elsevier's move to cut off some German researchers also provides a test as to whether the scientists can survive without a subscription deal with the mega-publisher, says Ralf

Schimmer, director of scientific information at the Max Planck Digital Library in Munich, Germany. "If it comes to hardship and misery, then the negotiators might be forced back to the negotiating table." His organization provides journal access to the dozens of Max Planck Institutes and their libraries, and its contract with Elsevier finishes at the end of this year.

Elsevier declined to comment on the move, which was reported by negotiators, some affected libraries and Germany's national university association. The Amsterdam-based company instead reiterated a 5 July statement saying it was committed to reaching a deal with the German consortium Projekt Deal, which is brokering an agreement on behalf of hundreds of Germany's universities and research organizations. Projekt Deal declared on 6 July that it had suspended talks with Elsevier. The publisher produces more than 2,500 journals, which issue in excess of 400,000 papers each year.