China's Five-hundred-meter Aperture Spherical Telescope will help the search for extraterrestrial life.

CHINA

As China continues to increase its investment in research, it is offering opportunities that can be difficult to find elsewhere.

BY REBECCA KANTHOR

In 2007, while visiting his then girlfriend, US astronomer Eric Peng was working at a rented desk at Peking University in Beijing when he was approached by a fellow scientist. “You keep coming back,” the man said. “Are you looking for a job here?” Six months after this casual conversation, Peng was offered a faculty position in Peking University’s Kavli Institute for Astronomy and Astrophysics. “I think a lot of people thought it was an obvious thing to do, but I never thought I would actually move here.”

China’s economy has been growing more slowly in recent years: the gross domestic product (GDP) grew by 6.9% in 2015, compared

with 10.6% in 2010. But foreign researchers say that there has been no cooling of the enthusiasm for enticing talented scientists to work in the country. Overseas and expat scientists are persuaded with promises of generous funding and research opportunities. China’s most recent five-year plan, for example, pledged to continue with its drive to increase research and development funding as a proportion of GDP — from 1% in 2002 and 2% in 2014, to 2.5% in 2020.

The government launched its 1000 Talents plan in 2008 to attract scientists, entrepreneurs and finance experts from across the world. Precise figures for how many foreign scientists work in China are hard to come by, but according to anecdotal reports the incentives are working at least in some places. **PAGE 58 ►**

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JIANG GE

Associate provost at
ShanghaiTech University

Why should foreign scientists come to China?

The economy is strong, so the conditions are good and money for research is very stable. In fact, the government is increasing investment in basic research, not only for large-scale facilities, but more generally. I see Chinese people coming back from working in other countries, as well as foreigners coming to work here. Although some have had good opportunities abroad, here they have excellent equipment and there is support for those starting up their own research.

What do Shanghai and ShanghaiTech University offer foreign researchers?

Shanghai is unique in being a huge city with such a high density of facilities. And there are more facilities planned for the future. Researchers want a good research environment, with good academic partners and the funds to purchase the materials they need. That is what is on offer at ShanghaiTech University. Shanghai is also home to many scientific centres at which researchers from all over the country work on projects to serve the national interest. These include the Shanghai Synchrotron Radiation Facility, the National Center for Protein Science and the Free Electron Laser Facility. These large-scale projects are funded by the central government and the Shanghai local government.

What skills do foreign researchers need to work in China?

We don’t have enough top-quality researchers to help China to reach the level of research we are aiming for, so that’s what we’re looking for. Shanghai is an international city so it is not essential to speak Chinese — English is widely understood among the research community. **R.K.**

This interview has been edited for length and clarity.

WHERE TO WORK

The top ten institutions in mainland China, based on research output included in the *Nature Index*, May 1 2015–April 30 2016, shown as weighted fractional count (WFC), a measure of the relative contribution of an author to an article weighted to correct for imbalances between subjects. Bars are divided according to the proportion that each subject area contributes to the overall score.

1. Peking University / WFC 298.1

2. Nanjing University / WFC 240.7

3. Tsinghua University / WFC 238.8

4. University of Science & Technology of China / WFC 236.6

5. Zhejiang University / WFC 168.3

6. Fudan University / WFC 159.3

7. Institute of Chemistry, Chinese Academy of Sciences / WFC 146

8. Nankai University / WFC 143.8

9. Beijing National Laboratory for Molecular Sciences / WFC 115.1

10. Xiamen University / WFC 108.7

Overlaps in subject areas may cause some distortion to relative subject proportions.

SALARIES

Chinese starting salaries are among the lowest in the Asia-Pacific countries profiled, especially for those lower down the pay scale, according to data collected in *Nature's* interviews.

COLLABORATIONS

China's average collaboration score (top) — the sum of *Nature Index's* fractional count (the relative contribution of authors to an article) for international collaborations divided by the number of countries China collaborates with.

RESEARCH FOCUS

The search for extraterrestrials gets a boost this year with the completion of China's new Five-hundred-meter Aperture Spherical Telescope (FAST). As well as hunting for life on other planets, the world's largest radio telescope, which was finished in July after 22 years of planning and 5 years of construction, will also allow astronomers to study pulsars — the cores of exploding stars — and survey hydrogen in faraway galaxies.

Built at a cost of 1.2 billion yuan (US\$180 million) in a valley in the remote, mountainous region of the southern Guizhou province, FAST is made up of 4,450 triangular panels fitted into a giant dish with a surface area of 36 American football fields. Its 500-metre width smashes the previous record, held by the 305-metre wide Arecibo radio telescope in Puerto Rico. Some 9,000 people have reportedly been relocated to allow FAST to be built.

The enormous size of this instrument, which has been nicknamed 'Sky Eye', makes it more powerful and sensitive than previous radio telescopes and allows it to survey a larger part of the sky. Because it should be capable of picking up weaker radio signals from further away than any previous telescope, FAST will be particularly useful in the hunt for extraterrestrial life.

FAST forms part of China's plan to build up its space programme. Having put its first astronaut in space in 2003 and having launched its first unmanned lunar expedition in 2013, the country is planning to have an operational space station by around 2020 and to put a person on the Moon by 2030. ■

Staff at the construction site of FAST — the world's most powerful radio telescope.

OU DONGQUXINHUA/EYEVINE

► Peng says that half of the postdocs and 20% of the faculty at his institute are from abroad.

The rapid growth of research funding in China makes it an attractive place for researchers looking to set up their own laboratories and projects. For Peng, it meant the opportunity to co-found the Telescope Access Program. Now in its sixth year, the US\$13-million project gives Chinese astronomers observation time on optical and infrared telescopes around the world.

Ross Howie, a physicist who completed his PhD at the University of Edinburgh, UK, three years ago, is enjoying the greater auton-

"I HAVE ALMOST COMPLETE FREEDOM TO PURSUE MY RESEARCH GOALS."

omy his move to China in 2015 has allowed him. He is investigating materials synthesis under extreme pressures and temperatures at the Center for High Pressure Science and Technology Advanced Research in Shanghai. "I have been given a platform to build my own laboratory and have almost complete freedom to pursue my research goals," says Howie.

CHINA HAS 50 UNESCO WORLD HERITAGE SITES, SECOND IN THE WORLD ONLY TO ITALY.

ENTRY REQUIREMENTS

- Employers must apply for work permits on behalf of employees. This includes presenting CVs, university transcripts and certificates, and making the case that no Chinese national can fulfil the job requirements.
- Once a work permit has been granted, employees must apply for a single-entry work visa called a Z visa.
- On arriving in China, the employee and their employer have one month to apply for a residence visa. The visa can take up to three months to process and is valid for one year, after which it must be renewed annually.
- The bureaucratic hurdles associated with visas and work permits can be frustrating; some have reported having to fly back to their home country to wait for documents.

OPPORTUNITIES & CONTACTS

- The 1000 Talent Plan of Foreign Experts offers attractive salary and research funding packages to those willing to work in China for three years.
- The 1000 Talent Plan for Young Professionals seeks to attract scientists aged under 40 who are seen as future leaders in their fields.
- The President's International Fellowship Initiative provides Chinese Academy of Sciences funding to PhD students and postdocs.
- The National Natural Science Foundation offers grants to both foreign and returning Chinese scientists seeking to collaborate with Chinese scientists.

Despite such opportunities, relocating to China can come with challenges. Many grant proposals must be written and defended in Mandarin, although some organizations, such as the National Natural Science Foundation of China, have started to accept grant proposals in English. Scientists complain of excessive paperwork and frequently changing policies. Research institutions can reallocate grant money to other projects that don't have funding. And Internet censorship hinders research.

Jordanian neuroscientist Nashat Abumaria, at Fudan University in Shanghai, has seen such challenges defeat a number of foreign researchers since he arrived in the country in 2007. But he enjoys the drive and ambition of his Chinese colleagues, some of whom he has developed strong friendships with. Abumaria has turned down job offers from elsewhere and plans to stay as long as he can. "I've learned one important thing," he says. "You can not expect China to change for you. You must change and adapt with China."

Peng advises those willing to give working in China a try to think like an entrepreneur to make the most out of their experience. "There are definitely failings in the system," he says. "But there are a lot of advantages too." ■

ZAI LAB

SAMANTHA DU

Chief executive officer at Zai Laboratory, Shanghai

What is it like working in biotechnology in China?

The government wants to promote innovation, so it is very interested in the biotech sector. Both Chinese and global investors are keen to invest in it. Many Chinese entrepreneurs, people in the pharmaceutical industry and researchers want to come back to China to start their own businesses. Compared with the United States and other developed countries, Chinese biotech is still at an early stage, but it's catching up fast. The sector is booming.

What skills are biotech companies looking for in foreign scientists?

They are the same as any US biotech company. I see a lot more opportunities opening up. We have recruited a group of overseas talent that has tremendous experience in drug discovery and development.

How will foreign biotech scientists benefit from working in China?

It will help them to understand biotech culture and pharmaceutical research in China. Eventually, if they want to go back to their home country they will have a lot of connections here. It also gives them the opportunity to return to China later, possibly as a representative for US or European companies.

What is the best thing about working in biotech in China?

It's very dynamic. For example, the government recently approved a pilot plan that will allow contract organizations to produce drugs. Those working in biotech in China are at the forefront not just of scientific discovery, but also of a generation pushing for new regulations that will pave the way for the development of truly innovative medicines in China. **R.K.**

This interview has been edited for length and clarity.