

before the lab's funding became really tight, but he is starting to doubt that a research career is for him. "Here people work like crazy for a few years, then they go abroad, come back and become professors here — at least that's what happened with the previous generation. This generation might be forced to change this," he says. "Young people are seriously considering doing their whole careers abroad."

SEARCH FOR SALVATION

Scientists in São Paulo state are better off than elsewhere in Brazil, thanks to a provision in the state constitution. Under that stipulation, the São Paulo Research Foundation (FAPESP), which provides grants to researchers, has been receiving 1% of São Paulo state's annual tax receipts since 1989. Researchers say that this model buffers shifts in the availability of science funding. Applications for FAPESP postdoc fellowships have risen by 8.5% in the past year.

Still, neuroscientist Miguel Nicolelis, a faculty member at Duke University in Durham, North Carolina, says that he was disheartened by a recent visit to the University of São Paulo (USP), where he earned his PhD and medical degree. "When I heard of the difficulties young researchers were facing, I was ready to cry because, in my opinion, USP is a patrimony of the Brazilian people," he says.

Both nations have tried to expand research in the private sector, but have met with mixed success. Argentina's science minister, Lino Barañano, has prioritized translational research in key areas, including biotechnology and agriculture. But the funding dried up before his efforts had a chance to generate much in the way of profits and jobs, says Tomás Santa Coloma, a biomedical researcher at the Pontifical Catholic University of Argentina in Buenos Aires. Current policies to lure foreign investment don't favour the small- to mid-sized start-ups that Bertucci thinks could power the economy.

Fernanda de Negri, a researcher at the Institute for Applied Economic Research, a Brazilian government-affiliated think tank, says that Brazil's efforts in innovation are stymied by counterproductive legislation. One law, for example, gives tax breaks for corporate research and development, but another discourages investment by the private sector.

It seems that little will soon improve, says Glauco Arbix, former head of FINEP, the Brazilian federal government's primary innovation funding body. "Brazil's system is a jungle of impediments," he says, "dedicated to creating obstacles to research and innovation." ■

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TURNING POINT

Galactic groundbreaker

Astrophysicist Marcelle Soares-Santos, a Brazilian native, leaves the Fermi National Accelerator Laboratory in Batavia, Illinois, this month to launch her own lab at Brandeis University near Boston, Massachusetts. She plans to merge her enthusiasm for galaxy clusters and gravitational-wave research to develop tools to explore how the Universe expands and evolves.

What drew you abroad?

I was doing my PhD at the University of São Paulo in Brazil, researching galaxy clusters, when I received a sandwich fellowship from the National Council for Scientific and Technological Development in Brasília. Under this programme, students start their PhD in Brazil, travel abroad to do research and return to Brazil to graduate. The middle of my sandwich was at Fermilab, and that experience changed the trajectory of my career.

How so?

Cosmologist Scott Dodelson, who works at Fermilab, gave a talk in Brazil the year before I came here. I chatted with him and was able to work with him once I secured the sandwich fellowship, and discovered there that I could build a larger network of collaborators and broaden my research interests.

Were you in the right place at the right time?

Definitely. In 2010, as I was finishing my PhD, the Dark Energy Survey — an international effort to produce a map of the Universe's expansion — was ramping up and I knew I wanted to work on it. So I applied for a postdoc at Fermilab and got it. I was lucky enough to have the opportunity to work on construction of the Dark Energy Camera, which is mounted on a telescope at the Cerro Tololo Inter-American Observatory in Chile. Now I'm analysing data from the camera I helped to build, which is amazing.

How did you get involved in the search for gravitational waves?

In 2013, the multinational collaboration overseeing the Laser Interferometer Gravitational-wave Observatory (LIGO) was preparing to begin observations in 2015 from two gravitational-wave detectors — one in Hanford, Washington and one in Livingston, Louisiana — that detect ripples in spacetime. The collaboration asked for people to look for electromagnetic signals that would corroborate their results. I proposed to my colleagues that we form a team to search for



visible evidence of LIGO-detected events, such as black-hole collisions, which appear bright and then fade. We haven't found anything yet, but it's just a matter of time until we do.

What are your plans?

I want to use gravitational-wave events to map out the history of expansion of the Universe, and, because galaxy clusters grow at a rate that also depends on cosmic history, combining the two is a powerful way to probe cosmology.

What is your response to a recent survey about gender and racial harassment in astrophysics?

I try not to think too much about these issues. Racism and sexism are not easy to talk about when you want to focus on research. It's frustrating because I don't see much change.

How will you try to make a difference?

Starting my own lab provides one space where I can enact change, and be more inclusive, more open and more fair. I will be careful to check my own biases. I am concerned about perpetuating some behaviours, such as preferential support for certain students.

Will you return to South America?

No. The research possibilities would be limited there today, given both the political and funding situation. I maintain contact and collaborations with colleagues in Brazil, and I plan to find ways to improve those connections — perhaps by hosting a student on a sandwich fellowship one day. Most of my colleagues who went abroad returned to Brazil and got established there, which was a big success for the sandwich programme and helped to strengthen research in Brazil. ■

INTERVIEW BY VIRGINIA GEWIN

This interview has been edited for length and clarity.