Physics in Brazil takes center stage as World Cup comes to town

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As Brazil gets set to host the 2014 FIFA World Cup this month amid concerns about the amount of public money being used to stage the world's largest sporting event, *Physics World*'s editorial team reveals in a new special report how physicists are taking full advantage of the four-fold increase in science funding that the government has invested over the past 10 years.

Negotiations are currently under way to make Brazil an associate member of the CERN particle-physics lab in Geneva, while the country is also taking a leading role in the Pierre Auger Observatory – an international project based in Argentina designed to study ultrahigh-energy cosmic rays.

Building is also under way to create a world-leading synchrotron source, Sirius and Brazil is poised to become the first non-European member of the European Southern Observatory.

Carlos Henrique de Brito Cruz, a physicist at the University of Campinas and scientific director at FAPESP – one of Brazil's most important funding agencies – told *Physics World* that the expectation is for Brazilian scientists to take a leadership role in such large research projects "and not just watch as mere participants".

Considering the first graduate programmes in physics did not emerge in Brazilian universities until 1960, the rise to becoming one of the leading participants in international collaborations has been a rapid one.

The reputation of Brazilian physics has grown in line with a massive increase in science funding, which rose from R$12bn (about £3bn) in 2000 to R$50bn (around £13bn) in 2011.

Brazil's spending on R&D now accounts for 1.2% of the gross domestic product and 40% of the total funding comes from companies.

The Brazilian Physical Society has around 6000 members comprising almost all research physicists in the country, who wrote around 25 000 research articles in international science journals between 2007 and 2010.

A lack of funding in the past had forced Brazilian scientists to focus on cheaper, theoretical research, but this has now changed and there is an almost even split between theory and experiment at universities.

Yet Brazil still suffers from several long-standing problems, the most significant being the poor standard of science education in high schools. A combination of low pay and lack of recognition makes physics teaching an unpopular choice of occupation despite attempts to tackle the problem.

Even those students who do see physics as a career option end up struggling and under-prepared for the rigours of an undergraduate physics course. Vitor de Souza, an astrophysicist at the Physics Institute at São Carlos, which is part of the University of São Paulo, told *Physics World* that of the 120 students who start a four-year physics degree at his university, only 10-20 actually graduate.

Another problem in Brazil is a fundamental disconnect between academic research and industrial development, with universities not sure how to handle spin-off firms and companies suspicious of universities.

More broadly, physicists feel that Brazilian society does not recognize the value of science, and that this can only be overcome when the physics community becomes more ambitious and more audacious.

More information: The *Physics World* Special Report on Brazil can be accessed at this URL: mag.digitalpc.co.uk/fvx/iop/physworld/brazil14/

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