New directions for developing-world science

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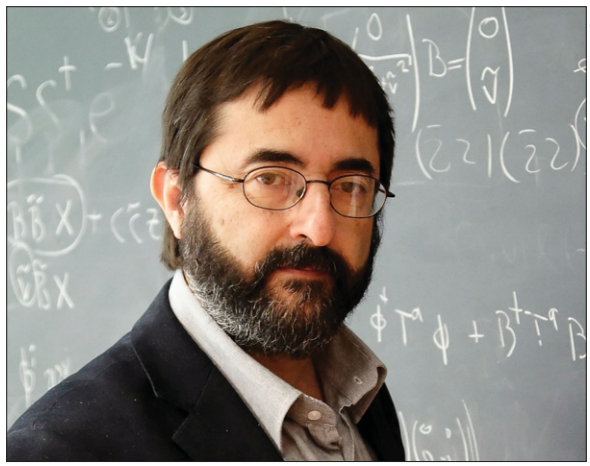
The Abdus Salam International Centre for Theoretical Physics has been nurturing science in the developing world for 45 years, but can it adapt and expand without losing focus? **Margaret Harris** talks to new director Fernando Quevedo about his plans for the centre's future

When it was Fernando Quevedo's turn to introduce himself at a meeting for new CERN staff several years ago, the Costa Rica-born theorist had a flash of inspiration. "You were given just two minutes to say how great you were as a scientist, how many papers you had written – that kind of thing," he recalls. "So I told them, 'I am the only scientist in this room who can claim he is the best high-energy physicist in the history of his country!'."

Quevedo tells the story with a broad smile, sitting opposite an equation-filled blackboard in his office on the top floor of the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy. Yet as the centre's fourth director, Quevedo clearly takes its mission to help scientists in the developing world very seriously indeed. Barely a year after his appointment in October 2009, he has already articulated a bold five-point strategy for expanding the ICTP's reach, both geographically and in terms of its research focus (see box). Although he warns that achieving his more ambitious goals will depend heavily on finding new sources of funding, the next five years could nevertheless see the biggest changes to the ICTP's role since the end of the Cold War.



ICTP

At the chalkface
Fernando Quevedo, director of the Abdus Salam International Centre for Theoretical Physics in Trieste, Italy.

Five priorities for the ICTP

1. Establish a formal PhD programme at the centre in Trieste
2. Set up regional branches of the ICTP in "transition" countries (e.g. Brazil)
3. Add new research units in energy, quantitative biology and computing sciences to the existing groups at the ICTP
4. Develop Internet-based resources for teaching and learning in the developing world
5. Seek new funding to pay for it

Reaching further

Founded in 1964 by the Pakistani theoretical physicist (and future Nobel laureate) Abdus Salam, the ICTP has a dual mission: to pursue world-class research; and to nurture science in the developing world. Every year, it welcomes 5000 scientists – half of them from developing countries – to its hillside campus on Italy's Adriatic coast. There, researchers from both developed and developing countries can attend conferences, collaborate with the centre's 30 permanent scientific staff and participate in training courses. The centre also sponsors programmes targeted at particular groups from the developing world. These include graduates taking an intensive one-year diploma course at the ICTP to prepare them for PhD study at Western universities; established researchers visiting as part of the centre's associates programme; and experimental scientists coming to work in Italian laboratories.

But although the ICTP has always been a place where researchers from the South can share ideas with their northern-hemisphere colleagues, some aspects of its role have changed over its 45-year history. During the Cold War, for example, it was an important bridge between East and West, thanks in part to its location five miles from what used to be the Italian–Yugoslav border. After the fall of the Berlin Wall in 1989, the ICTP had to adapt to a changed political landscape. Now, Quevedo argues, it needs to do so again – this time to take into account the increased diversity of the developing world, as so-called transition countries pull ahead of their neighbours while others fall further behind.

"The developing world has changed a lot in the past 45 years," he explains. "Countries such as Brazil, China and India have always been on the receiving side from the ICTP, but now they have reached such a high level that I think they should become our partners instead." As part of this new partnership, Quevedo plans to establish branches of the ICTP in some of these transition countries. These new satellite organizations will serve as regional centres for scientific outreach, he says, helping both their host countries and neighbouring nations.

The ICTP is also trying to do more for countries at the bottom of the economic scale. For example, almost half of the 50 students accepted onto its diploma programme in 2010 come from what the United Nations terms "least developed countries". These are countries where the per-capita gross national income is below $905 and factors such low literacy rates inhibit economic growth.

In many countries, though, the education offered is so poor that even the brightest would-be physicists are not prepared for the rigours of the ICTP diploma. To reach them, Quevedo plans to expand the ICTP's educational efforts to include teacher training, and perhaps even online courses in basic undergraduate physics. "This is something we have not done enough at the ICTP in the past, and I would like to change that," he says, noting that the need for such programmes is just as great in Central America as it is in parts of Africa and Asia.

Back at home

In addition to his plans to increase the ICTP's visibility in other countries, Quevedo also hopes to boost its scientific activities at home. His top priority is to establish a formal PhD programme at the centre, under the auspices of the Japan-based United Nations University. For students from the developing world, an in-house PhD is a natural extension of the ICTP's existing diploma course. Once up and running, it should absorb some of the students who complete the diploma but are unable to find PhD places at universities in Europe or North America.

The ICTP's permanent staff will also benefit from the doctorate programme, Quevedo says, because having students around "keeps your ideas fresh". He speaks from personal ex-

perience: although he is currently on leave from the UK's University of Cambridge, where he has been a member of the Department of Applied Mathematics and Theoretical Physics since 1998, his students still visit him regularly in Trieste to collaborate. Keeping active in research is important to Quevedo, and he credits both his predecessor as director, the Indian-born physicist Katepalli Sreenivasan, and Abdus Salam himself with setting a good precedent.

Another way that the new director plans to enhance research at the ICTP is by adding three new research areas – renewable energy, computational biology and computer science – to the centre's current suite. In broadening the centre's focus, Quevedo hopes to make use of its existing expertise, and also to foster closer links with Trieste's other international institutes. These include the International Centre for Genetic Engineering and Biology (ICGEB), which was founded in 1983 along similar lines as the ICTP to promote experimental biology in the developing world.

Will it work?

Progress is already being made on some parts of Quevedo's plans. The PhD programme, for example, has been approved by the ICTP's Scientific Council and its Steering Committee; the latter includes officials from the Italian government and two United Nations agencies, who administer the centre in a tripartite arrangement. Details are still being finalized, but Quevedo hopes to accept the first PhD students in autumn 2011 – although he acknowledges that 2012 is "probably more realistic".

Prospects for satellite versions of the ICTP in the developing world also seem promising. The centre's Office for External Activities already works with several affiliated centres and networks in some countries, and the strategic plan calls for a major expansion of its responsibilities. Moreover, the neighbouring ICGEB already has two satellite campuses – in New Delhi in India and Cape Town in South Africa – so ICTP planners can draw on some local expertise, too.

Expanding the research base will be tougher, and far more dependent on funding than the strategy's other components. The ICTP's financial support comes from a variety of sources, but the biggest contributor by far is the Italian government, which provides 86% of the ICTP's annual €20.8m budget. The final part of Quevedo's plan would be to establish a new Institute Advancement Office to seek additional sources of funding, such as governments of other European countries. However, getting support from other nations was also a priority for Quevedo's predecessor (see October 2004 pp8–9 and April 2003 p15), and the current funding squeeze in many rich countries will only add to the challenge.

Yet even if the new plans are only partially carried out, Quevedo's own experiences demonstrate the potential benefits of extending the ICTP's scope. As an undergraduate in Guatemala in the early 1970s, he recalls that he did not even know it was possible to study physics or mathematics. As a result, he began as a systems-engineering student, switching to physics only after the 1976 Guatemala City earthquake closed the national university and forced him to transfer to a smaller, private one that offered physics as a separate subject. No university in Guatemala offered a PhD in physics, he went to the University of Texas instead – becoming a prime example of the "brain drain" that the ICTP aims to prevent.

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Some things have improved in Guatemala since then, Quevedo says, noting that there is "more awareness of science – you're not viewed as completely crazy to be studying it". Still, there is a lot of work to be done, both in Central America and in other regions, and he believes that the ICTP is well placed to tackle the remaining issues. One thing that attracted him to the job of ICTP director, he says, was the opportunity to attack the problems faced by scientists in the developing world from the top down.

So is he still the best high-energy physicist that Guatemala's education system has ever produced? "There aren't many people who have PhDs in Guatemala, but there are now three or four high-energy physicists there, so I have competition," he says, grinning. "Now I can say I'm the oldest!"

CERN unveils giant mural of the ATLAS experiment

CERN

The ATLAS collaboration at the Large Hadron Collider (LHC) belonging to the CERN particle-physics lab near Geneva last month unveiled a giant mural of the general-purpose detector. ATLAS lies 100 m underground and studies the matter left over when protons collide with each other. Painted on the side of a grey, three-storey-tall service building belonging to the collaboration, the mural is about a third of the size of the actual detector. The work was created by US artist Josef Kristofoletti and took more than three months to complete. Kristofoletti was asked to make the mural after being spotted with a smaller painting of the ATLAS detector at the Redux Contemporary Art festival in South Carolina. Meanwhile, last month the LHC reached its target luminosity – a measure of the proton–proton collision rate in the experiments – for 2010 of 10^{32} per square centimetre per second. This month CERN will begin to collide lead ions together in the LHC.

Michael Banks