

Physics for the poor

TRIESTE

IN 1949 a 23-year-old Pakistani called Abdus Salam earned a first-class degree in physics from Cambridge University in only one year, an almost unheard-of achievement. In 1950 he solved a problem in mathematical physics that had been holding up theorists, and became famous (at least among particle physicists) overnight. Then in 1951 he returned to his native Pakistan, and found himself isolated. Without a library and bereft of colleagues, the only theoretical physicist in the country spent three years doing little more rewarding than managing the college football team. In 1954 he returned to Britain, a reluctant brain-drainee.

Since then Abdus Salam's theories about the symmetries of nature have earned him a Nobel prize. But he has not only changed the way that physicists think; he has made a new place for them to think in. In the early 1960s he urged the International Atomic Energy Agency (IAEA) to provide physicists in poor countries with an alternative to emigration. His idea was a place where they could catch up with their craft as practised in Western Europe and America, and then go home refreshed and up-to-date. In 1964 the agency agreed and the International Centre for Theoretical Physics (ICTP) came into being. The Italian government provided more money and a building in Trieste. The centre is now one of a number of similar institutes there, and part of a fast-growing network of scientific expertise.

To celebrate its quarter century, and to honour the man who made it possible, the centre hosted a conference at the beginning of November, a *tour d'horizon* of the physical world. Leading physicists gave talks on the latest marvels of their fields, from pools of fluid electrons sandwiched between semiconductors, to the huge, all-but-invisible rafts of "cold dark matter" which may or may not make up 90% of the universe. Dr Ludvig Faddeev, of the Stetlov Mathematical Institute in Leningrad, intrigued a sceptical audience with his idea that the advances of the past century of physics, one of the greatest intellectual stories history has to offer, could be summed up as just the deformation of a generalised

set of equations and that the whole thing (physics, not the universe) was about to end.

The diversity and quality of the talks was typical. From the start, it was vital to the success of Dr Salam's idea that visitors from poor countries should not merely be offered crumbs from the table—they should dine on ideas cooked up by the best minds. So he persuaded the best physicists of the day to



Dr Salam, working for physics

participate right from the beginning. After only four years the ICTP was sufficiently well established to attract a dozen Nobel laureates for a month-long conference.

The centre has now held some 400 courses, workshops, seminar series, conferences and the like. It has also provided physicists with the time and stimulation to produce over 5,000 papers published in international journals. Since UNESCO joined the IAEA in running the centre, its activities have expanded beyond theoretical physics into applied physics—that of the earth and the oceans, of molecules and of lasers. It now

has laboratories for work on microprocessors and superconductivity—a field Dr Salam still does some work in, and to which he was introduced, ironically, during his time kicking his heels back in Pakistan.

Over 25 years, 22,000 physicists from poor countries, often on ICTP fellowships, have passed through Trieste and—for the most part—gone on their way inspired afresh. It is said that every physicist in India has either been there, is going there, or wants to go there. There have also been many visitors from communist countries. During the 1960s and 1970s the centre was one of the few places in which American and West European physicists could talk to their Russian counterparts. This was one of the centre's aims from the beginning. At one of the first seminars Dr Roald Sagdeev, who is now one of Mikhail Gorbachev's closest scientific advisers, almost strangled himself with a microphone cable while over-energetically covering a blackboard with equations about plasma physics, a speciality in which Russian physics was exceptionally strong. Now there is talk of setting up a similar centre in Moscow.

Indeed, there is talk of setting up similar centres all over the place, from the Orkneys to Texas. Three more are being started in Trieste, under the auspices of the UN Industrial Development Organisation and paid for mostly by the Italian government (which now provides 90% of the ICTP's \$19m budget). Italy is happy to pay for such things as part of its aid budget, especially since it helps to win Trieste fans as a "science city". One of the new centres will be devoted to chemistry, one to the earth and the environment, and one to high technology and new materials. There is already a Centre for Genetic Engineering and Biotechnology where work is done on the papilloma virus, which has been linked with cancer of the cervix and uterus, and on designing bugs to eat the lignin in dead plants. Trieste also boasts the Third World Academy of Sciences, another of Dr Salam's inventions, which links institutes and initiatives around the world.

His plans are now reaching new levels of ambition with a proposal for 20 high-technology colleges dotted around poor countries, perhaps with some money from the World Bank. Unsurprisingly, he does not get much time to do physics in the conventional way. Yet there is more to physics than writing equations. By using his charm, determination and intellectual standing to win over politicians he has achieved plenty for

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physics and physicists in poor countries and elsewhere. Besides, as he points out with a grin, the scientific ideas that he and others put forward two decades ago are still holding up well under experiment—though they have evolved a bit—so he does not feel under too much pressure to cook up new theories just yet.

The fact that the movement that began with the ICTP is broadening and turning to more practical fields of thought does not

mean Dr Salam has retreated from his goal of providing developing countries with better theoretical physics. He has two reasons for championing what might seem an overly sophisticated development tool. One is that high technology depends on the knowledge, training and culture provided by academic physics; poor countries will never be able to compete until they can provide them. The other is that he loves physics, and devotes himself to serving it any way he can.