

The Telegraph KnowHOW

MONDAY 19 JULY 2004

UNIQUE
MANDATE

Eye for talent

The auditorium of the Indian Association for the Cultivation of Science (IACS) is not particularly suited for a speaker's comfort. As if the whirring of the ceiling fans isn't enough, the sound system fails now and again, making it doubly difficult for the audience to follow a lecture. But Prof. Katepalli Raju Sreenivasan isn't bothered a bit, immersed as he is in his talks on turbulence, one of the unsolved riddles of theoretical physics. His presentation, full of graphs and equations, is

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Pathik Guha meets a physicist who thinks encouraging others is his mission

PICTURE BY S. BHENDU CHAKI

R&D

Older stars

■ A large number of stars in the galaxies were already in place early in the Universe's formation, reports *Nature*. Researchers at the Johns Hopkins University in Baltimore came to this conclusion after analysing light from 300 galaxies to look into a cosmological blind spot and explore an era of 8-11 billion years ago, when the Universe was only 3-6 billion years old.

Arsenic check

■ Scientists at the University of Melbourne are using insects to measure high levels of lethal arsenic and other heavy metals that contaminate the soil in old gold mines. They are detecting the pollution level by watching how quickly the insects are killed while trying to eat plants that absorb arsenic from the ground.

Muddy ring

■ Saturn's rings are a lot dirtier than originally believed. New observations in infrared pictures taken by *Cassini* spacecraft reveal that the inner regions are packed with rock and mud. The ice is thought to contain water mixed with other frozen substances like ammonia. "We thought the rings are mostly made of water," said Larry Esposito of the University of Colorado, US.

T-shirt with a computer screen

Want to make your T-shirt literally a flashy one, sporting a running electronic billboard seen at the sidelines of a soccer stadium in Europe? The R&D section of France Telecom is toying with such an idea and has already developed a prototype of a flexible light emitting diode (LED) screen that fits into special pockets of cloths and backpacks and displays text, drawings and animations live.

Weighing only 150 gms (including a rechargeable battery) and measuring 70 square cm, these colourful and easier-to-fit displays do not reduce the comfort level of wearing a shirt. The flexible circuit board shouldered with electronic components (including LEDs) gets sandwiched between the layers of fabric and maintains the "textile feeling".

The removable screen is connected to a mobile phone via its network, so drawings and animations can be sent by multimedia messaging service (MMS) to another user with the same equip-

ment. Thanks to a dedicated embedded software application, the cellular handset can be used as a remote-control to activate the screen's functionalities like adjusting the brightness, selecting the image or text to be displayed, entering text, drawing simple animated visuals, downloading animations from the Internet, and swapping them to the built-in LED.

By Sovon Manna

Sensors integrated into the screen mean it can also be used as a stand-alone device to display visual sequences stored in the screen's memory or specific animations triggered by certain gestures or sounds. The light gets brighter each time wearer claps.

Experts think the potential of smart "wearable communications" is boundless when it comes to creating and offering new and useful services for customers — to alert to a danger, or exchange information, or, more simply, to customise one's clothing at will and in real time to stay in fashion.

an exercise in history-digging too. Sreenivasan, delivering the Second Chanchal Kumar Majumdar Memorial Lecture, describes the early works of Lars Onsager, the Yale University professor who earned the Nobel Prize in chemistry in 1968.

Onsager, says Sreenivasan, hit upon a brilliant idea in 1945. Like any other youngster he requested many stalwarts of his day to evaluate its worth. But all of them, including the future Nobel laureate Linus Pauling, disappointed him, offering backhanded compliments like saying that they couldn't rise up to his level of understanding. Onsager, undeterred by such caveats, pursued the idea which finally earned him the Nobel. "Onsager's episode comes to my mind each time I receive a paper by a young researcher," says Sreenivasan concluding his lecture. "I ask myself, 'Am I paying the attention the youngster deserves?'"

Sreenivasan's concern for promoting talents isn't simply an elder scientist's obligation towards the new generation. In his case it's a mandate, for he's the director of the International Centre for Theoretical Physics (ICTP). It was set up by the Pakistani physicist Abdus Salam (who won a Nobel in physics in 1979) in Trieste, Italy, in 1964 with a specific goal — to offer research opportunities to promising scientists from the developing countries.

Sreenivasan's declaration of solidarity with his peers from countries like India takes many forms. The announcement by the hosts before his lecture that the funds for it was raised only through subscriptions from some friends of the late Prof. Chanchal Kumar Majumdar makes him sympathetic to the cause. At the end of his lecture, when Prof. Jayanta Bhattacharjee from the IACS offers him an envelop containing the honourarium, he politely says, "Please keep it with you. And consider me a friend in your cause."

Born at Kolar, 40 kilometres from Bangalore, Sreenivasan is by training an engineer. He got his bachelor's degree from Bangalore University (ranking first and earning Sir M. Visvesvaraya Memorial Prize), and masters from the Indian Institute of Science (IISc), before joining Sydney University as a post-doctoral fellow in 1975. Since 1977, he's been in the US, teaching at different institutions, including Johns Hopkins University, Yale University and the University of Maryland.

What prompted him to become the director of ICTP in March last year? This is what Sreenivasan had to say replying to this question from *ICTP News*, the house journal of his centre, last year: "When I was about 12 or 13, my family priest taught me a prayer and said that I was to recite it 108 times a day: one hundred for myself and eight for the rest of humanity. If I did not find the time for 108 recitations, I should do 58; 50 for myself and eight for humanity. And if I couldn't do 58, I should do 33; 25 for me and eight for humanity. The point is that no matter how much or how little one does for oneself, one should always contribute a constant amount for humanity. Coming to ICTP and furthering its causes may be my way of contributing to the rest of humanity."

Training in India as well as stints in the US may have provided Sreenivasan the mindset for his current assignment. "You can understand Prof. Salam's frustrations when he came back to Lahore from Cambridge," the ICTP director tells me in an interview after his talk at the IACS. "He realised he was losing touch with the international community of physicists. He had to be in their midst, had to compete with them in research. What's better than to have an institute of one's own?"

ICTP is a huge establishment now, with an annual budget of 22 million euros. It operates under a tripartite agreement between the Italian government (which provides 75 per cent of its funding), the United Nations Educational, Scientific and Cultural Organisation (UNESCO), and the International Atomic Energy Agency (IAEA). The centre now has about 27 permanent research scientists in most areas of physics and mathematics, a number of consultants, about 50 post-docs, and about 4,000 visiting scientists (50 per cent of them from the developing countries) annually. "There are a few other in-

Contribution for humanity

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stitutions with visitor programmes similar to those found at the ICTP—for example, the Institute of Theoretical Physics at Santa Barbara, US, and the Newton Institute at Cambridge, UK," says Sreenivasan. "Yet the ICTP is unique in its mandate, which involves not merely serving the global scientific community but paying particular attention to the needs of those from the developing world. We must attract and retain the best scientific talent that we possibly can, and, at the same

discussions with some physicists here. "I know some good work on nanotechnology is being done here," he comments. "But those doing the work have no idea how to take it to the market, and there are none to guide them in this direction. That's not the case in the West."

Told that a common man's idea of excelling in science is only bagging Nobel Prizes, and that Indians mostly think that their scientists aren't just good enough to figure in the thoughts of the selectors in Stockholm, Sreenivasan says he doesn't think so. "There are Indian scientists of world-class calibre," he remarks. "Not many of them are there, but a handful, definitely. I don't know whether they will earn Nobels or not, but certainly there are talents for that."

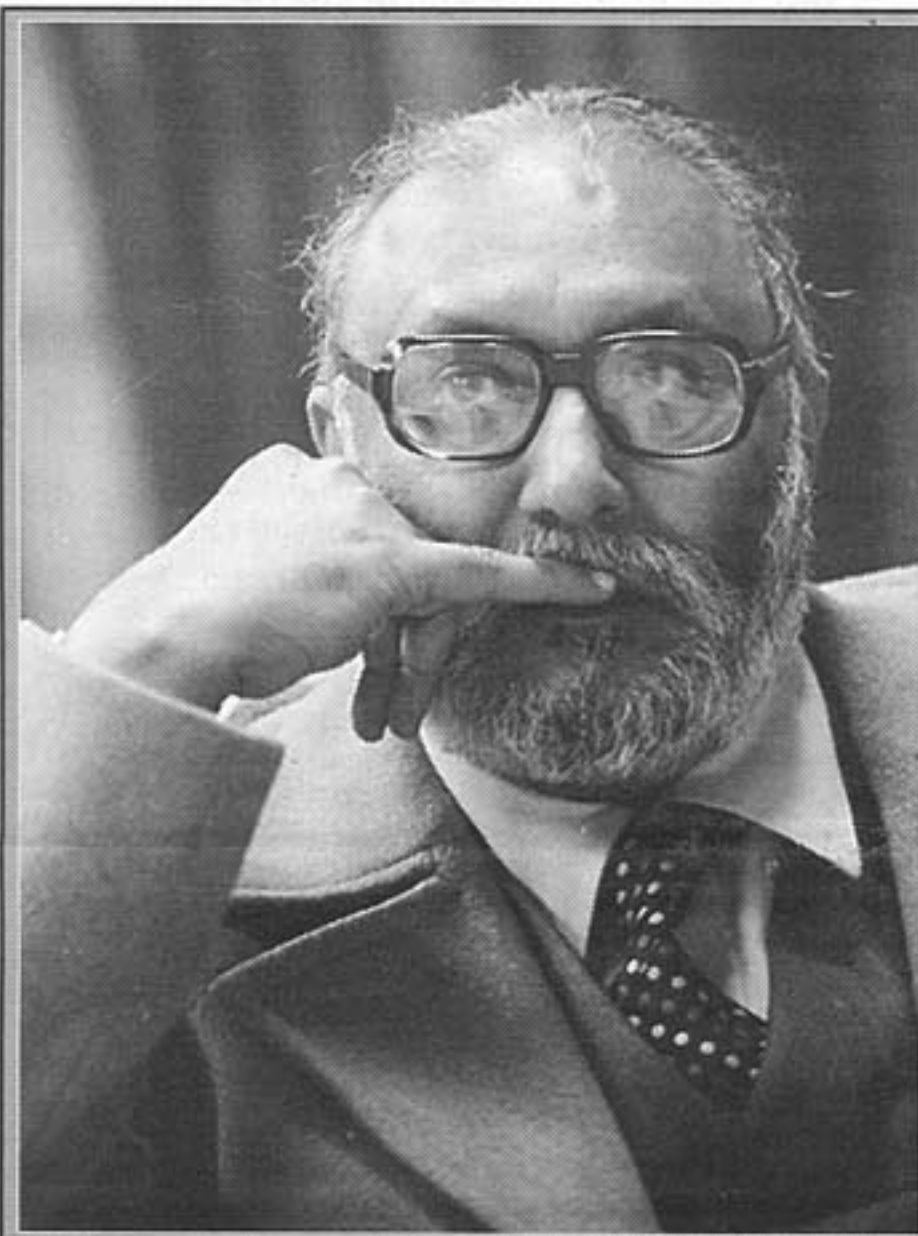
Wasn't Prof. Subrahmanyan Chandrasekhar, a Nobel laureate in physics, right in claiming that the emergence of stalwarts like Jagadish Chandra Bose, C.V. Raman, Satyendranath Bose or Meghnad Saha was essentially the phenomenon of our defiance against the British rule? Sreenivasan doesn't buy the hypothesis. "I don't think you need to be under foreign rule to excel in science," he quips. "You need to appreciate the system under which science flourished in those times. Raman wasn't even a full-time researcher, yet he had access to a laboratory where he did a world-class work. R&D didn't enjoy large-scale state support then, yet we had outstanding scientists. Somehow, that environment has to be revived."

ICTP is planning to celebrate its 40th anniversary in October in a big way. "I wrote to around 200 scientists, including many Nobel laureates, to write briefly on what excited them, and hooked them to science, early in their life," says Sreenivasan. Many of those men and women, including Egyptian scientist and Nobel prizewinner Ahmed Zewail, have responded to his request and the ICTP plans to bring out a booklet comprising their comments during the forthcoming celebrations.

The events, says Sreenivasan, will be marked by the announcement for a new prize from the ICTP. "We have the ICTP Prize already for outstanding physicists below the age of 40. Now we'll have another prize, this time one for mathematicians below 40. It'll be called the Ramanujan Prize, after the math genius Srinivasa Ramanujan." Won't it be like the Fields Medal, the award that mathematicians the world over used to call their Nobel until the Norwegian government announced the £475,000 Abel Prize in 2002? The Ramanujan Prize, says Sreenivasan, will be like those two prizes. "I believe our awardees will attract the attention of the selectors of those two prizes."

Aggressive though for hawking the R&D from the developing countries, Sreenivasan is typically modest about his own achievements. He made headlines when he showed that turbulence, the phenomenon that is responsible for the uniform dispersal of sugar as we pour it in our tea and stir the brew, could help us understand the nature of the leftover radiation from the Big Bang, the cataclysmic birth of the Universe. I ask him if his findings have been accorded adequate praise. No, he says, the reception can be called "lukewarm". Only a few cosmologists have shown some interest.

Now that he is a science administrator, a lot of his time must be devoted to managerial work. Doesn't it make him sad? Sreenivasan says administrative work at the ICTP doesn't take away all his time. "I stay alone in Trieste," he tells me, "my family is still in the US. My wife, Sudha, a practising psychiatrist, is there with my two sons. My elder son, Kartik, is attending college, and younger son Aditya is in school in Connecticut. As I stay so far away from them, I've a lot of time left to myself. And I make the most of it. You see, I've time for administrative as well as scientific works. I couldn't have been more lucky."



STALWARTS FROM THE DEVELOPING WORLD: Professors Salam (left) and Zewail

time, promote world-class science in the developing world."

Isn't the brightest of the lot from the developing world ending up at the best labs in the West already? I ask Sreenivasan. "Yes, they are going there," he says, "for example, researchers from the Tata Institute of Fundamental Research (TIFR), Mumbai, or IISc, Bangalore, don't find it that difficult to land assignments there. But what about researchers from, say, Shillong University. Who'll help them? I think we at the ICTP have an obligation towards them. Besides, there are political compulsions that often complicate situations. What happens to a brilliant researcher belonging to a university in Iran? He can't go the Massachusetts Institute of Technology (MIT) or California Institute of Technology (Caltech). He should have a place to do world-class research."

Sreenivasan is well aware of the malady facing basic research in India today. The brightest of the youngsters are not attracted to it in the way they were a long time ago. They are now going in for engineering streams. Will this trend not tell upon India's progress in science and technology? "It will," he comments, adding, "but please don't blame our students alone. Our system do not encourage science that much. You see, in countries in Europe or North America, science research is translated to wealth. Which is why people there do not mind huge investments on R&D. That's not the case in India. People here don't think it's an area that should see a lot of investments. And politicians' acts only reflect a common man's thoughts."

Sreenivasan says during his stay at the IACS he has had

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