2006 Shanti Swarup Bhatnagar prize

A press release issued by the Ministry of Science and Technology, Govt of India on 30 August 2006 announced the award of the Shanti Swarup Bhatnagar (SSB) prizes for science and technology for the year 2006 to thirteen scientists 'for their outstanding contributions made primarily in India during the last five years preceding the year of the prize... . The SSB prize comprises a citation, a plaque and a cash award of Rs 200,000'. The SSB prize winners for 2006 are:

Biological Sciences: Vinod Bhakuni, Central Drug Research Institute, Lucknow
Rajesh Sudhir Gokhale, National Institute of Immunology, New Delhi.

Earth, Atmosphere, Ocean and Planetary Sciences: Gufran-ullah Beig, Indian Institute of Tropical Meteorology, Pune
Pulak Sengupta, Jadavpur University, Kolkata.

Physical Sciences: Atish Dabholkar, Tata Institute of Fundamental Research, Mumbai
Sanjay Puri, Jawaharlal Nehru University, New Delhi.

Medical Sciences: Virender Singh Sangwan, L. V. Prasad Eye Institute, Hyderabad

Chemical Sciences: Srinivasan Sampath, Indian Institute of Science, Bangalore
K George Thomas, Regional Research Laboratory, Thiruvananthapuram.

Engineering Sciences: Ashish Lele, National Chemical Laboratory, Pune
Sanjay Mittal, Indian Institute of Technology, Kanpur.

Mathematical Sciences: Vikraman Balaji, Chennai Mathematical Institute, Siruseri
Indranil Biswas, Tata Institute of Fundamental Research, Mumbai.

MEETING REPORT

QuarkNet workshop for physics teachers*

A two-day workshop on hands on experience in setting up of a cosmic ray detectors and analysing cosmic ray data for teachers in and around Bangalore was conducted on 10 and 11 March at the Data Information Centre of the Indian Institute of Science, Bangalore. This coincided with the International Linear Collider Workshop (LCW06) organised by the Centre for Theoretical Studies, IISc, Bangalore from 9 to 12 March. The workshop was organised at the behest of the quark net team at the Fermi National Laboratory. Their team comprising of Marge Bardeen and Robert S. Peterson, along with S. C. Tonwar, B. S. Acharya from TIFR Mumbai and Raghava Varma from IIT Bombay conducted the workshop.

QuarkNet is a teacher professional development programme funded by the National Science Foundation and the US Department of Energy. School teachers work on particle physics experiments and join a cadre of scientists and teachers working to introduce some aspects of their research into their classrooms, bringing them to the frontiers of 21st century research in particle physics. The QuarkNet centres are connected to high-energy physics experiments operating at CERN, Switzerland, at Fermi National Laboratory, Illinois, SLAC, California and others. In the framework of this programme physicists mentor work and collaborate with high-school teachers spread across the globe. QuarkNet resource persons travel around the world and show teachers and students how to build a simple cosmic-ray detector, which consists of a plastic scintillator, a common piece of equipment in any nuclear or particle physics laboratory. Along with the detector is attached a global positioning system and a data acquisition card which can be hooked onto any personal computer. On the occasion of the International Linear Collider Workshop, the QuarkNet team demonstrated scintillator pieces, photo multiplier tubes, GPS receivers, data acquisition card and other relevant material from the Fermi National Laboratory, USA. They conducted this workshop for physics teachers in and around Bangalore. In this workshop, first the teachers were introduced to the subject of cosmic rays and how to detect them. Further, they were involved in the process of assembling a detector using a plastic scintillator, a light guide, photomultiplier tube and other materials, followed by hooking up the data acquisition card and the GPS receiver to a PC. The GPS system gives the data a time stamp. All the data that the detector collects (say here in Bangalore) then resides on the QuarkNet portal (http://quarknet.fnal.gov/e-lab) at Fermi National Laboratory. Students/teachers are given usernames and passwords, using which they would be able to use the whole set-up to collect data and upload them to the QuarkNet portal. One can, in turn, have access to data collected by other schools/students across the globe, who are also participating in the experiment. They will be able to further participate in analysing these data and in the process learning the basics of data analysis.

In all, 23 lecturers from various schools and colleges (22 from local schools and colleges and one from Pune) were invited to participate in this exercise. Rohini Godbole, IISc welcomed all the participants and described to them the purpose of such a workshop. Bardeen then introduced the concept of QuarkNet and its aim. Peterson gave a short lecture on what would be done over the next two days of this workshop. The emphasis was clearly on WE: what we will do together.

These were followed by an inspiring lecture by Tonwar on what cosmic rays are, how they are detected, questions about our universe they helped to answer, and what are the open problems with which physicists all over the world are still

*A report on the two-day workshop for physics teachers held on 10–11 March 2006 at the Digital Information Services Centre, Indian Institute of Science, Bangalore and organized by the Indian Academy of Sciences, Bangalore.

grappling with. This was then followed by an equally informative lecture by Acharya on detector technology, how it is built, and what we measure using it. There could not be any doubt that the inquisitiveness of the teachers was aroused by these two talks.

Next the teachers were asked to explore the QuarkNet URL at Fermi National Laboratory. This was a good learning experience for all the participants. They were allowed to access some of the data collected by students elsewhere, as also see some of the posters prepared by them. Many of them were creatively thought-out problems. This provided an inkling into the nature of work that could be carried out using the detectors. They were helped in this by Bardeen and Peterson and also by Acharya and Raghava Varma. Later, in the evening the teachers were divided into four groups. One group was assigned the task of assembling the detectors, the other three were assigned the task of choosing one set of data to be analysed (the URL contains a number of options).

The next day the detector group started fabricating the detector, while each of the other groups tried to converge on what analysis they should do. After the morning tea session, the groups that were engaged in data analysis presented what they were going to look for, while the detector group started assembling the detector. All the resource persons were actively involved in assisting the groups while assembling. The participants were not just piecing together the equipment, but also simultaneously getting insight into the various aspects of the principles of physics involved. Often one had to sit with the teachers and explain the limitations. Each of the groups was first allowed to find the right path or suitable hints were given by the resource persons to help them come back on track. Similar methodology was adopted with the assembly team. In the afternoon, it was a moment of joy for the assembly team to see its detector detecting cosmic rays. With every count on the display unit of the data card, the smiles and surprises on the participants' faces got bigger! However, due to slow bandwidth of the Internet, it was not possible to store the data on the Fermi National Laboratory Grid. Team by team, participants were given a short time to present what they learnt from their efforts. Judging by the response of the participants, the meet was a big success.

The entire hardware kit used in the workshop was gifted to the participants for follow-up action by the QuarkNet team from USA. The detector is now set up at the Jawaharlal Nehru Planetarium, Bangalore by H. R. Madhusudana. It was felt that it would be useful to repeat such workshops in a few places around the country.

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MEETING REPORT

Conservation of cycads in India*

Cycads are the most primitive seed plants characterized by a large crown of compound leaves and a stout trunk. They originated 300 million years ago and are often termed 'living fossils' as they have undergone little change compared to their Mesozoic ancestors. The gymnosperm order Cycadales comprises about 300 extant species in three families, viz. Cycadaceae, Stangeriaceae and Zamiaceae. *Cycas* is the only genus represented in India within cycads. Six species namely *C. rumphii*, *C. sphaerica*, *C. circinalis*, *C. beddomei*, *C. pectinata* and *C. annaikalensis* occur in India of which the last four are endemic. *C. beddomei*, endemic to the Cuddapah hills of Eastern Ghats is considered highly endangered. The exotic species *C. revoluta* is widely cultivated as an ornamental plant. Emergence of the Asian cycad scale, *Aulacaspis yasumatsui* (Hemiptera: Diaspididae) as an invasive pest of international importance that kills cycads, is threatening with the extermination of the endemic species in countries of its invasion. A native of the region between Thailand and China, the Asian cycad scale has recently spread to the Pacific, Caribbean, USA and Taiwan. It is quite possible that this scale may gain entry into India through infested planting material leading to the extinction of endemic cycads. In the backdrop of the threat of introduction of the Asian cycad scale, a workshop on conservation of cycads in India was held at Thiruvananthapuram. Incidentally, Kerala (erstwhile Malabar coast) happens to be the type locality of *C. circinalis*, the first known cycad described by Linnaeus in 1753. Papers dealing with every aspect of cycad study were presented and discussed in five sessions, viz. morphology and systematics; ecology, regeneration and ethnobiology; pests and diseases; distribution and documentation, and threats and conservation.

Cycads are characterized by many interesting morphological and physiological features that are distinct from other phanerogams. Long living leaves as well as stems with persistent pith and cortex comprising living parenchyma and concentric vascular cylinders have critically contributed towards the survival of cycads. The cycad–cyanobiont symbiosis that affords access to fixed nitrogen is yet another reason for their survival throughout tens of millions of years. All

Cycascircinalis – megasporophyll.

*A report on the Workshop on Conservation of Cycads in India held at Thiruvananthapuram during 17 to 20 July 2006, funded by the Indo-US Technology Forum, New Delhi.