

space charge effects became very important and the tune of the machine early in the cycle had to be increased in both planes, using trim quadrupoles.

The closed orbits become very sensitive and these too have to be finely adjusted, not least so that lost beam falls on the collectors and not elsewhere in the ring. Finally on 5 February, the design intensity was reached when  $2.52 \times 10^{13}$  protons per pulse were taken to the target at 50 Hz; a mean current of 201 microamps, at an overall efficiency of 82.6%.

Reaching the 200 microamp level is highly satisfactory as early design changes reduced the expected maximum current from 200 to 167 microamps, due to the space charge forces. The peak intensity has been achieved without sextupoles and octupoles, which are now available for further experimental studies.

Operationally, the facility runs for over 4000 hours a year. ISIS has been running with an availability of

about 90%, and the record average current over 24 hours is 181 microamps.

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## BOMBAY Instrumentation school

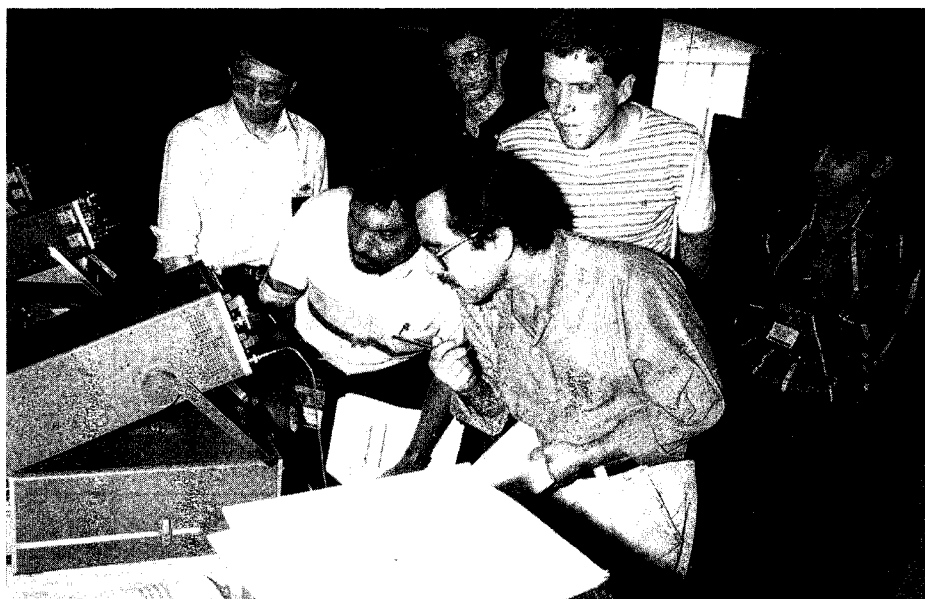
Promising students had a foretaste of the latest laboratory techniques at the ICFA 1993 India School on Instrumentation in High Energy Physics held from February 15 - 26 and hosted by the Tata Institute of Fundamental Research (TIFR), Bombay. The scientific programme was put together by the ICFA Panel for Future Instrumentation, Innovation and Development, chaired by Tord Ekelof (Uppsala).

The programme included lectures and topical seminars covering a wide range of detector subjects. In small groups, students got acquainted with modern detector technologies in the

laboratory sessions, using experimental setups assembled in various institutes world-wide and shipped to Bombay for the School. The techniques covered included multiwire proportional chambers for detection of particles and photons, gaseous detectors for UV photons and X-ray imaging, the study of charge drift in silicon detectors, measurement of the muon lifetime using liquid scintillators, tracking using scintillating fibres, and electronics for sensitive detectors.

The India School was attended by around 80 students from 20 countries; 34 came from Indian universities. It was the fifth in this series, previous Schools having been at Trieste (1987, 1989 and 1991) organized by the ICFA Panel and hosted and sponsored by the International Centre for Theoretical Physics, and in 1990, organized at Rio de Janeiro in collaboration with the Centro Brasileiro de Pesquisas Fisicas.

The School was jointly directed by Suresh Tonwar (TIFR), Fabio Sauli (CERN) and Marleigh Sheaff (University of Wisconsin), and sponsored by TIFR and DAE (India), CERN (Switzerland), ICTP and INFN (Italy), British Council and RAL (UK), NSF and DOE (USA), KEK (Japan), IPP (Canada) and DESY (Germany).



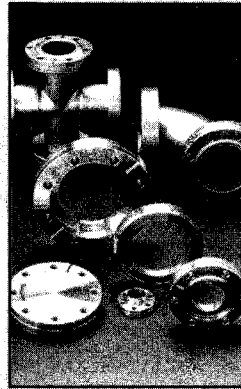
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*Students around one of the experiments at the ICFA 1993 India School on Instrumentation in High Energy Physics from February 15 to 26 hosted by the Tata Institute of Fundamental Research (TIFR), Bombay.*

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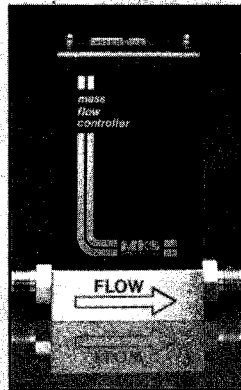
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