Push for non-accelerator particle physics

A small group of scientists from universities and other academic and research institutions met, 18 to 20 November, at the Indian Institute of Science (IISc) in Bangalore to discuss topics that fall in the area designated as non-accelerator particle physics (NAPP). In July the Department of Science and Technology's (DST) Programme Advisory Committee on plasma, high-energy and nuclear physics had reviewed the status of NAPP in India, and adopted a resolution urging DST to ensure continued accessibility to the low-background-radiation deep-mine research facility at Kolar Gold Fields (see *Current Science*, 1991, **61**, 308). The KGF facility, of Bombay's Tata Institute of Fundamental Research, is well known for work on cosmic-ray neutrinos and the search for proton decay, one of the testable consequences of Grand Unified Theories (GUT).

Study of the fundamental aspects of the physics of elementary particles and fields without recourse to gigantic man-made high-energy particle accelerators such as the superconducting super collider or the large hadron collider has its own fascination and advantages. For one, in view of the smallness of the scale of experiments, the scientist is able to participate in all its aspects—from the theoretical motivations that initiate the study to the design of the instruments and the methodology and finally the analysis of the results. Again, the low-energy consequences of the Grand Unification of all the forces at high energy might indeed provide the most accessible and clearest signatures of the physics that lies beyond the so-called Standard Model. India has a great tradition in NAPP, and the work has involved cosmic-ray* and other astrophysical observations as probes of the properties of elementary particles; a variety of 'table-top' experiments have also been performed to probe fundamental aspects of physical laws.

*See 'Special section', this issue.

Among the topics discussed in the IISc meeting were: 1. discrete symmetries and their experimental tests, such as the electric dipole moments of electrons and neutrons; 2. nuclear-physics experiments that probe discrete symmetries and the mass of the neutrino; 3. study of the fundamental aspects of quantum mechanics and its nonlinearities with experiments like optical multiphoton interferometry; 4. the quark content of the photon and the interactions of TeV gamma rays; 5. search for new intermediate-range forces; 6. gravitation experiments; 7. experimental searches for dark matter; 8. study of new physics through ultra-high-energy gamma-ray and neutrino astronomies; 9. study of solar neutrinos; 10. phenomenological, theoretical, astrophysical and cosmological studies relevant to NAPP. One of the objectives of the meeting, coordinated by N. Mukunda of IISc's Centre for Theoretical Studies, was to assess India's capabilities to evolve strategies for new initiatives.

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