

## FOREWORD

The biggest endeavour of humankind during the 20th century had been the search for the ultimate structure of matter. And nuclear physics undoubtedly has contributed a great deal to it. Therefore, this year's nuclear physics symposium, being the last of the century, acquired a special importance. To represent the world view of current trends in nuclear physics at the turn of this century, the symposium was elevated to the level of an international symposium. The topics of the invited talks were chosen so as to represent the present research interest and the future projections. The format of the symposium comprised of 43 invited talks and 250 presentations in the poster sessions. Twenty one invited speakers were from abroad and 22 from within the country. The symposium was held at Bhabha Atomic Research Centre during December 18–22, 2000, and was inaugurated by Dr. Raja Ramanna, the eminent nuclear physicist of the country. An all encompassing summary of the symposium was given by Prof. H Ejiri from RCNP, Japan.

To give a short overview, a series of talks on the relativistic heavy ion collisions summarized the observations at CERN pointing towards a possible onset of the quark gluon phase transition at fixed target 158 GeV/N Pb–Pb collisions. The first results from colliding Au–Au beams at 130 GeV/N from the PHENIX experiment at RHIC were presented, indicating, as desired, an improvement over CERN in all the parameters relevant to the formation of QGP. The talks on the QCD related nuclear physics concentrated on the structure of hadrons and the role of chiral symmetry. The role of the latter was demonstrated in connecting the lattice QCD calculated nucleon properties (which can be done only for large quark masses at present) to the corresponding properties observed for the real hadrons. The talks on neutrinos concentrated on their interaction in astrophysics for transition from  $u, d$  quark system to strange quarks in stars and equation of state of such a matter. Results were also presented on using nucleus as a microlaboratory to explore the neutrino oscillation issue. At intermediate energies, results were presented for the dynamics of pions, etas and strange particles ( $\Lambda, K^+$ ) production near their respective thresholds in nuclear collisions. A series of talks were given on the nuclear physics associated with unstable beams coming from RIKEN, GANIL and GSI facilities. Indications for new magic numbers and superheavy elements gravitating around magicity  $Z = 118$  were discussed. Using high intensity secondary beams ( $10^5$  cps  $^{11}\text{Li}$ ) from RIKEN and up to 1 GeV/N at GSI efforts for the search of new isotopes and their properties were reported. At low energies, neutron spectrometry methods for neutron cross section measurements specific to stars, waste transmutation etc., were presented. In low energy heavy ion research, answers to questions like the effects related to entrance channel, comparison of the hot rotating nuclei to cold (ground state) nuclei, detailed understanding of the compound nucleus decay etc., were sought. In a few talks the highlights of the research carried out using the accelerator facilities in the country were presented. On accelerators, a talk was given on the utilization of proton beams for radiation therapy. A few talks gave the status of the upcoming accelerator facilities in India, SPES RIB facility in Europe and the RIB factory in Japan.

One session of the symposium was held at TIFR.

Excellent *santoor* recital by Pt. Satish Vyas, one evening, was another highlight of the symposium.

This volume represents the symposium proceedings consisting of manuscripts that were received from the speakers at the time of going to press. We are thankful to the authors for their promptness and for following the required guidelines in preparing their manuscripts.

The success of the symposium was the collective efforts of many people. We put on record our thanks to all of them, especially to the members of the International Advisory Committee, Organizing Committee and the members of the Nuclear Physics Division, BARC, for their advice and help at various stages of organizing the symposium.

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