skills, has to increase along with linkages with education and research institutions, something that has been tried successfully in the past[1].

Recently, the Government of Karnataka, in particular, has begun an exercise of determining 'satellite' towns and cities that could be developed to address the growing needs of the IT industry. The central government also approves of this approach by the states and is supporting these efforts by providing grants for infrastructure development. A question that several chapters in the book address is whether such efforts by governments in targetted development of particular geographical zones is likely to succeed. The answers are complex. For one thing, small towns will find it hard to attract skilled labour to migrate there, as they lack the necessary city amenities like education, entertainment, etc. that enhance the quality of life. The towns will be limited by their access to markets, educational institutions and other firms, that firms locating there can cooperate with (until, of course, such multiplicity of firms is established). These are the classic factors by which clusters such as those in Silicon Valley emerged and those such as Nanjing, outside Shanghai, were unable to grow despite government efforts. However, the factors that could nourish such towns would be the growing use of ICT within government and industry that will result in up-skilling and create a class of technology-savvy people in the existing industrial sectors of these towns, the geographical diversity of engineering and other colleges across the states that will enable ICT industries to draw from local talent, and the increasing knowledge-base of management in using and deploying ICT. These factors, compounded with the overcrowding and choking of infrastructure, and the increasing wage rates in big cities such as Bangalore, will possibly enable these towns to flourish as large software companies, that anyway have their markets in North America or Europe, will want to further exploit the cost and infrastructure advantages of small towns.

Clearly, the issues are many and complex for those investigating the sustainability aspects of ICT for economic development in India. The dynamics of markets, institutions and government policies will drive India's future in this domain, but for researchers these are exciting times to observe and theorize about the developments.

Overall, I think this is an excellent book for those interested in the issues of ICT for development in India. A whole host of issues are covered and many arguments are put forth with conviction. The volume is well edited – the articles are succinctly written and the presentation is precise with adequate tables and figures.

1. Patibandla, M. and Petersen, B., *World Dev.*, 2002, **30**, 1561–1577.

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Annual Review of Nuclear and Particle Science. Boris Kayser *et al*. Annual Reviews, 4139 El Camino Way, P.O. Box 10139, Palo Alto, California 94303-0139, USA. Vol. 55. 2005. 599 pp. Price: US $50.

Physics research is increasingly becoming borderless and boundaries between nuclear and particle physics on the one hand, and astrophysics and nuclear/particle physics on the other are thinning. In fact, currently the interface areas between different branches are getting highlighted and the present volume of *Annual Review of Nuclear and Particle Science* has done full justice to this important aspect. The outstanding problems in these areas are addressed: Relativistic heavy ion collisions, nuclear equation of state and the behaviour of hadronic matter at high density, temperature and energy density; fundamental structure of matter and questions to be solved by future accelerators like electron–ion collider; small-x phenomena: from HERA to LHC and beyond; baryon asymmetry in nature and leptogenesis as the origin of matter; physics beyond standard model; yet to be observed Higgs particle, dark matter, etc; neutron as a microscopic laboratory to investigate fundamental symmetries, and ascertaining the core collapse supernova mechanism. Majority of the articles are divided between nuclear, particle and interface areas. Few reviews are on astrophysics, cosmology and nuclear/particle physics borderline areas. It is an unenviable task to summarize in a few pages, the masterly written articles numbering 13 covering 588 pages. We have made an attempt to give details of some of the review articles.

The present volume starts with a lucid historical account by Perkins, of evolution of modern particle physics from the early cosmic ray-based research. The exciting developments in particle physics due to the exponential growth of accelerators of increasing energies and intensities resulting in our present-day understanding of quarks and leptons as constituents of matter are captured. The futile attempt on searching for proton decay which finally led to the unexpected observation of neutrino oscillations and neutrino mass and prospects of new physics beyond the standard model are part of history. His central message is to look for the unexpected or else it will be one of missed opportunities.

Experiments using slow/cold neutrons address a range of problems encompassing different branches, from nuclear physics to cosmology. The current world average value of neutron lifetime is 885.7 ± 0.8 s. Attempts are underway to extend these measurements with ultra cold neutrons (energy less than 0.2 μeV) to achieve a precision of 0.1 s. The search for the neutron electric dipole moment addresses issues which lie at the heart of modern cosmology and particle physics. The current experimental bound on the electric dipole moment is $< 0.63 \times 10^{-25}$ e.cm. There are ambitious efforts underway to improve this limit by one to two orders of magnitude, again using ultra-cold neutrons. It is known that the weak interaction is responsible for neutron decay. In addition to the coupling of quarks to leptons that allows neutrons to decay, electro weak theory also predicts that there are weak interactions between the quarks in the neutrons. Nico and Snow have discussed at length the current attempts to determine experimentally the weak N–N interaction, in addition to the other aspects of neutron research.

According to the Big Bang model of creation of the universe, matter and the antimatter should be equal in proportion. But in nature we find more of matter. This is also expressed as baryon asymmetry and the dynamical theories addressing this problem are referred to as baryogenesis. In a seminal work, Sakharov pointed out three conditions: (i) Baryon number violation; (ii) violation of charge conjugation symmetry and the composition of parity and charge conjugation symmetry, and (iii) departure from thermal equilibrium to be necessarily satisfied in the early universe in order to generate matter–antimatter asymmetry. However, there are many ways to satisfy these conditions. One of the possible ways could be through leptogenesis, in which the asymmetry has been first created in the lepton sector and then converted partly into a baryon asymmetry. This mechanism is closely linked to neutrino sector parameters and hence can be crucial for verification of the above hypothesis. Buchmuller, Peccei and Yanagida also point out how super symmetric candidates of dark matter are constrained if thermal leptogenesis is the source of baryon asymmetry.

Mezzacappa points out that it is important to know the evolution of the massive star, with iron core surrounded by lighter elements to the stage of core collapse and finally to supernova formation. Even after nearly four decades, modelling the core collapse supernova mechanism remains elusive. Three-dimensional, general relativistic magneto hydrodynamics models of core-collapse supernovae are required to predict accurately all of the associated observables. Peta-scale supercomputers may be required for this purpose. Mezzacappa argues that simulations should also include magnetic fields, neutrino transport and high-density equation of state.

Understanding the fundamental structure of matter is one of the central goals of scientific research through the ages. Quarks and gluons and their interactions constitute the strong interaction as we know it today, and quantum chromodynamics (QCD) is the theory advocated for this purpose. Despite its success, it is still unclear as to how QCD works. The intriguing questions are: What is the gluon distribution in a nucleus? How does one understand the spin of nucleon in terms of quarks and gluons? Process of hadronization starting from quarks and gluons! Deshpande *et al.*, discuss the physics of polarized and unpolarized electron–proton and electron–nucleus collisions and point out as to how this study will lead to better understanding of fundamental structure of matter.

The standard model is the currently accepted model of elementary particle interactions. In this model a key role is played by the hitherto not discovered Higgs boson, which is responsible in understanding the origin of the masses of elementary particles. One of the problems of the standard model is the hierarchy problem, which in general terms suggests that the parameters of the model have to be severely fine-tuned in order to describe the real world. To alleviate this problem, a new scenario called little Higgs theories has been suggested. According to this, Higgs are the pseudo Nambu–Goldstone boson of a spontaneously broken global symmetry beyond TeV energy scale. Schmaltz and Smith discuss some aspects of little Higgs theory and point out precision electroweak constraints on these theories.

String theory was presented as a model describing all the fundamental interactions of nature, including gravity. One of the landmark discoveries of string theory is D-branes, which are higher dimensional hyper surfaces on which open strings are free to move. These have led to the identification of non-Abelian gauge bosons as open strings on the world volumes of the D-branes and chiral fermions as open strings living on the intersections of two D-branes. Intersecting branes world scenario is one of the latest efforts towards the goal of deriving the standard model from string theory. Blumenhagen *et al.* have given an overview of the recent activities of this field, explaining fundamental aspects of string phenomenology for non-experts.

In understanding the nature of strong interactions, progress has mostly come from the investigation of certain 'extreme' kinematic regions, in which the dynamics simplifies. One such scenario is where the c.m energy of collision is significantly larger than the masses of the hadronic systems. The other situation is where the characteristic momentum transfer is significantly larger than the typical mass scale associated with the hadron structure. A particularly interesting region of strong interactions is hard scattering process in the region, where the c.m energy becomes large compared to the momentum transfer. In deep inelastic lepton–hadron scattering, this process corresponds to values of the Bjorken variable $x << 1$. Because of large momentum transfer, these processes probe the quark and the gluon degrees of freedom. The present review is an attempt to summarize what has been learned about small-x physics from experiments of high-energy electron–proton collisions at HERA and antiproton–proton collisions at the Tevatron and use this information to make predictions for new QCD phenomena observable at LHC. At the LHC it is expected to see more clearly, evidence for enhanced gluon densities at small-x leading to observation of a new dynamical effect of unitarity or black disk limit in the interaction of small dipoles with hadronic matter (black disk limit). Importance of small-x physics in ultra peripheral collisions at LHC and future electron–ion collider is also brought out by Frankfurt, Strikman and Weiss.

In charged particle collisions at large impact parameters, the ions interact through photon–ion and photon–photon collisions known as ultra-peripheral collisions. Using LHC and with Pb + Pb collisions, one could reach maximum γp energies of 705 GeV and $\gamma\gamma$ energies of 178 GeV. Photo production at hadron colliders is derived from the possibility it offers, of a direct determination of the gluon distribution in nucleons and nuclei. Bertulani, Klein and Nystrand have reviewed this field and have pointed out that it is possible to investigate production of ρ^0 at LHC nearly ten times better than what could be done at the RHIC.

Study of nucleus–nucleus collisions at ultra relativistic energies offers a way to understand the behaviour of matter at extremes of density and temperature. The Quark Gluon Phase change is one of the dramatic processes expected in these collisions. Chiral symmetry restoration and deconfinement phase transition are testable in ultra relativistic collisions. However, the experimental study of QCD at high temperatures and densities is complicated by the short lifetime and mesocopic extension of the produced system. Spatio-temporal characterization of the collision region on femtometre scale – the femtoscopy – is needed to frame any discussion of dynamical equilibration processes. Lisa *et al.* discuss the measurement of size and shape that uses two-particle correlations at small relative momentum – the HBT method to obtain information of the collision region. Femtoscopy is now considered a precision measurement. No dramatic findings have been made at RHIC so far on this count,