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Reflections on the future of High Energy Physics

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The last decades have seen the rise of an elegant theory of fundamental interactions, the Standard Theory, culminated in the discovery at CERN of the Brout-Englert-Higgs boson. There remain however reasons to think that the Standard Theory may not be the last word. I review the last confirmations of the Standard Theory and illustrate few directions presently explored, among them the search of dark matter, Majorana neutrinos, the muon anomaly. A new subject is the study of new kind of subnuclear particles that, unlike like usual baryons and mesons, cannot be described as three quark or quark-antiquark states bound by QCD colour forces. Understanding the structure of these exotic hadrons will give information on the strong forces at low energy and offer a calibration ground for new computational tools such as lattice QCD. Finally, I will illustrate the accelerator plans and the new technology to push forward the high energy frontier.

Prof. Luciano Maiani graduated at Sapienza University of Rome, and then continued his studies at the University of Florence, under the supervision of Raoul Gatto. He was then research fellow at the Lyman laboratory of Harvard University and full Professor in Theoretical Physics at Sapienza University of Rome since 1976. He is widely renowned for having developed with Sheldon Glashow and John Iliopoulos the GIM mechanism, theoretically introducing the charm quark before it was discovered, and for his studies with Guido Altarelli on quantum chromodynamics. He was the director of CERN in Geneva from 1999 to 2003, and the director of the Italian Council of Research (CNR) from 2008 to 2011. He is Dirac medalist and APS Sakurai prize recipient. Prof. Maiani is currently affiliated to Shanghai Jiao-Tong University and Sapienza University of Rome. Since 2005 he is member of the Italian Academy of Science, "Accademia Nazionale dei Lincei".