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What's Next in Particle Physics? –Experimental Perspective

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Over the last five decades, many outstanding questions in particle physics have been answered, leading to the Standard Model (SM) and its spectacular confirmation with the discovery of the Higgs boson in 2012, which would supply the heart to this theory. Now the hunt is on for a deeper theory of reality. To answer this question, Europe, Japan, the US and China have proposed plans for building new particle colliders focused on studying the Higgs boson. Higgs' legacy will be the experimental particle physics programme of the 21st century. The open questions of today are just as profound as they were a century ago. However, there appears to be many more of them. Recent discoveries of the Higgs boson and Gravitational waves required increasingly sophisticated instrumentation and have created an exceptionally positive environment in society. Thus, we have a "virtuous cycle" which must remain strong and un-broken –laws of nature enable novel detector and accelerator concepts, which in turn lead to a greater physics discoveries and better understanding of our Universe.

Particle physics is now entering a new era. As the scale and the cost of the frontier colliders increases, while the timescale for projects is becoming longer, fewer facilities can be realized. Moreover, several high-energy physics (HEP) laboratories becoming multi-purpose ones. The pursuit of ever-higher energies will surely be one of the future directions of particle physics; the course will depend on whether one can continue to contain the cost of future colliders in the current worldwide environment. We must take a holistic view of particle physics - whether we find Beyond Standard Model physics at the LHC or not - and select the path to follow in a prudent manner, while maintaining HEP accelerator laboratories and expertise in all regions. Our culture and management structure must evolve to confront these challenges.

Author: Dr TITOV, Maxim (CEA Saclay, DRF/IRFU/DPhP, France)

Presenter: Dr TITOV, Maxim (CEA Saclay, DRF/IRFU/DPhP, France)

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