

Challenges of high-energy particle accelerators, from electromagnetism to geosciences

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Over their first century of existence, high-energy particle accelerators – the workhorses of particle physics – have developed from table-top instruments to become the largest scientific projects built by man. Even more impressive than their increase in size is the sustained improvement in their performance, achieved through developments in key technologies such as electromagnets, high-frequency systems, cryogenics, ultra-high vacuum and computer control. The multi-kilometre dimensions and underground implantation of these precision instruments also raise unconventional issues in geology, geodesy, civil engineering and environment. The lecture will introduce the basic features and design challenges of these machines, with particular emphasis on aspects linked to geosciences, illustrated by examples of the Large Electron-Positron collider (LEP), of the Large Hadron Collider (LHC) and of future projects under study.



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