

THE LARGE HADRON COLLIDER

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The Large Hadron Collider (LHC) at CERN is the largest **scientific instrument** in the world. The 26.7 km circumference accelerator brings into collision intense beams of protons and ions to probe the structure and investigate the forces of matter at the unprecedentedly fine scale of 1 TeV per elementary constituent (the “Terascale”), thus opening a new window on nature. To guide and focus its high-energy particle beams, the LHC uses several thousand high-field superconducting magnets, operating in superfluid helium at 1.9 K; thus the LHC also constitutes a **technological feat**. Initiated by the twenty member states of CERN, the LHC has also become a **global project**, serving a community of some 10’000 particle physicists from all over the world. We first present the main **accelerator physics** issues controlling the performance of the LHC, and then proceed to describe the challenges of its construction in the **key technologies** of superconducting magnets, powering, cryogenics and vacuum.