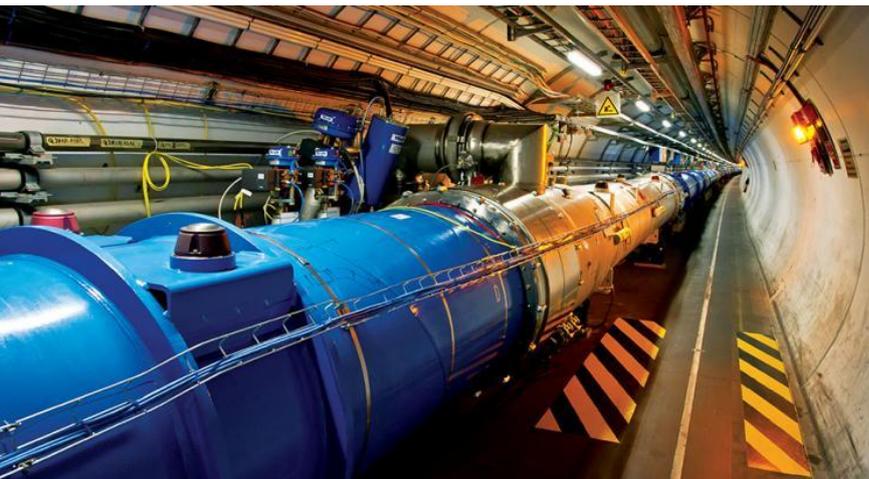


SCIENCE AND RESEARCH

Application: CERN-LHC, Large Hadron Collider



This international particle accelerator at CERN is dedicated to advanced research in the field of atomic physics. It is currently the largest research installation of its kind, situated at the Swiss-French border at Geneva. It consists of a 27-kilometre, underground ring in which protons and electrons are accelerated up to very high velocities and then directed to collide with each other. The high-energy dissipated during collision causes sub-atomic particles to be released, which are detected and characterized in special chambers (e.g. ATLAS). This data is of special interest to atomic physicists and has already lead to the

successful identification of the Higgs-Boson, 50 years after its prediction by the physicist Peter Higgs. This particle may prove to be fundamental for the theoretical explanation of mass and gravitational force. Around the LHC ring there are situated vacuum pumps, super-conducting magnets, beam collimators and a huge amount of temperature regulation as well as control and data-collection equipment. The development and erection of the LHC-installation cost over 7.5 Billion €. <http://home.web.cern.ch/topics/large-hadron-collider>

Project: LHC Collimation System

The high luminosity performance of the LHC relies on storing, accelerating, and colliding beams with unprecedented intensities. The transverse energy density of the nominal beam is 1,000 times higher than previously achieved in proton storage rings. Tiny fractions of the stored beam suffice to quench a super-conducting LHC magnet or even to destroy parts of the accelerators.



The LHC collimation system (over 150 individual collimators are situated around the LHC ring) protects the accelerator against such beam loss; which would otherwise impinge the supramagnets and cause them to fail ("go critical"). <http://lhc-collimation-project.web.cern.ch/lhc-collimation-project/>

MACCON contribution:

For this project MACCON designed, manufactured and supplied special stepper-motors and resolvers, which are designed to survive the full-life of the LHC experiment, over 30 years. In this period total radiation exposure may add up to more than 30 Mega-Gray. The motors and their resolver feedback enable the regular and precise positioning of two graphite bars within each Collimator, ensuring the integrity of the LHC accelerator and at the same time minimizing the amount of energy absorbed from the beam.