Quench incident

Run 1: first operational run (2009-2013)

Long Shutdown 1 (2013-2015)

Run 2: second operational run (2015-2018)

Long Shutdown 2 (2018-2021) and beyond

Timeline of operations

Findings and discoveries

First run (data taken 2009-2013)

Second run (2015-2018)

Planned "high-luminosity" upgrade

Safety of particle collisions

Popular culture

Fiction

See also

References

External links

Background

The term <u>hadron</u> refers to <u>subatomic</u> composite particles composed of <u>quarks</u> held together by the <u>strong</u> force (as atoms and <u>molecules</u> are held together by the <u>electromagnetic force</u>). The best-known hadrons are the <u>baryons</u> such as <u>protons</u> and <u>neutrons</u>; hadrons also include <u>mesons</u> such as the <u>pion</u> and <u>kaon</u>, which were discovered during <u>cosmic ray</u> experiments in the late 1940s and early 1950s. [13]

A <u>collider</u> is a type of a <u>particle</u> accelerator with two directed beams of <u>particles</u>. In <u>particle physics</u>, colliders are used as a research tool: they accelerate particles to very high <u>kinetic energies</u> and let them impact other particles. Analysis of the <u>byproducts</u> of these collisions gives scientists good evidence of the structure of the <u>subatomic</u> world and the laws of nature governing it. Many of these <u>byproducts</u> are produced only by high-energy collisions, and they decay after very short periods of time. Thus many of them are hard or nearly impossible to study in other ways. [14]

Purpose

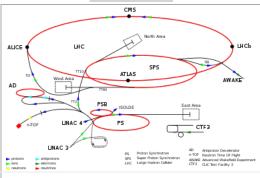
Many physicists hope that the Large Hadron Collider will help answer some of the fundamental open questions in physics, which concern the basic laws governing the interactions and forces among the elementary objects, the deep structure of space and time, and in particular the interrelation between quantum

SPS	Super Proton
	Synchrotron

Hadron colliders

Intersecting	CERN,
Storage Rings	1971-1984
Proton-	CERN,
Antiproton	1981-1991
Collider (SPS)	
ISABELLE	BNL,
	cancelled
	in 1983
Tevatron	Fermilab,
	1987-2011
Superconducting	Cancelled
Superconducting Super Collider	Cancelled in 1993
Super Collider	in 1993
Super Collider Relativistic	in 1993 BNL, 2000-
Super Collider Relativistic Heavy Ion	in 1993 BNL, 2000-
Super Collider Relativistic Heavy Ion Collider	in 1993 BNL, 2000- present
Super Collider Relativistic Heavy Ion Collider Large Hadron	in 1993 BNL, 2000- present CERN,
Super Collider Relativistic Heavy Ion Collider Large Hadron	in 1993 BNL, 2000- present CERN, 2009-
Super Collider Relativistic Heavy Ion Collider Large Hadron Collider	in 1993 BNL, 2000- present CERN, 2009- present

CERN accelerator complex



List of current particle accelerators at CERN

Linac 3	Accelerates <u>ions</u>
AD	Decelerates antiprotons
LHC	Collides protons or heavy ions
LEIR	Accelerates ions
PSB	Accelerates protons or ions

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