BBC NEWS

Collider to shut down for a year

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The Large Hadron Collider (LHC) must close at the end of 2011 for up to a year to address design issues, according to an LHC director.

Dr Steve Myers told BBC News the faults will delay the machine reaching its full potential for two years.

The atom smasher will reach world record collision energies later this month at 7 trillion electron volts.

But joints between the machine's magnets must be strengthened before higher-energy collisions can commence.

The Geneva-based machine only recently restarted after being out of action for 14 months following an accident in September 2008.

Dr Myers said: "It's something that, with a lot more resources and with a lot more manpower and quality control, possibly could have been avoided but I have difficulty in thinking that this is something that was a design error."

He said: "The standard phrase is that the LHC is its own prototype. We are pushing technologies towards their limits."

"You don't hear about the thousands or hundreds of thousands of other areas that have gone incredibly well.

"With a machine like the LHC, you only build one and you only build it once."

He said the second problem is not with the most complex technology but involves the copper sheaths around the superconducting joints in the tunnel.

The copper sheaths are a failsafe mechanism designed to take up the current if one of the magnets in the Large Hadron Collider warms up - an incident known as a "quench".

The 2008 accident caused one tonne of helium to leak into the tunnel and resulted in a series of "quenches" and a 40m Swiss franc (£24m) repair bill.

Engineers believe the machine is now safe to run at 7 trillion electron volts (TeV) but are anxious to avoid another breakdown.

So they have taken the decision to run the machine for 18 to 24 months at half-maximum power before switching it off for a year to carry out improvements to the 27km tunnel.

Dr Myers said the decision was taken jointly with the physicists working on the four giant particle detectors on the LHC.

He said they appreciate the chance to test their own equipment while the machine is running at half its maximum power.

Collisions at enormous energy

The Large Hadron Collider sends beams of protons in opposite directions around the tunnel at close to the speed of light. These cross and collide, smashing into each other with enormous energy.

The ultimate aim is to collide particles head on at 14TeV to recreate the conditions in the moments after the Big Bang.

Scientists hope they will see new subatomic particles in the debris and gain insights into how the universe came into being, billions of years ago.

The machine is buried 100m below the French-Swiss border.

Cern officials say running the LHC at 7TeV will enable physicists to explore another secret of the universe, namely the nature of the "dark matter" that accounts for most of the mass in the observable universe.

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