

# LHC completes the circle

November 7 2007

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At a brief ceremony deep under the French countryside today, CERN Director General Robert Aymar sealed the last interconnect in the world's largest cryogenic system, the Large Hadron Collider (LHC). This is the latest milestone in commissioning the LHC, the world's most powerful particle accelerator.

The LHC's cryogenic system has the task of cooling some 36 800 tonnes of material to a temperature of just 1.9 degrees above absolute zero ( $-271.3^{\circ}\text{C}$ ), colder than outer space. To do this, over 10 000 tonnes of liquid nitrogen and 130 tonnes of liquid helium will be deployed through a cryogenic system including over 40 000 leak-tight welds.

Today's ceremony marks the end of a two year programme of work to connect all the main dipole and quadrupole magnets in the LHC. This complex task included both electrical and fluid connections.

"This is a huge accomplishment," said Lyn Evans, LHC project leader. "Now that it is done, we can concentrate on getting the machine cold and ready for physics."

The LHC is a circular machine, 27 kilometres around and divided into eight sectors, each of which can be cooled down to its operating temperature of 1.9 degrees above absolute zero and powered-up individually. One sector was cooled down, powered and warmed up in the first half of 2007. This was an important learning process, allowing subsequent sectors to be tested more quickly.

“Over the coming months, we’ll be cooling down the remaining sectors,” said Evans. “Five sectors will be cooling by the end of 2007, with the remaining three joining them early next year.”

If all goes well, the first beams could be injected into the LHC in May 2008, and circulating beams established by June or July. With a project of this scale and complexity, however, the transition from construction to operation is a lengthy process.

“There is no big red button, and there are inevitably hurdles to be overcome as we bring the LHC into operation,” said Aymar, “Every part of the system has to be brought on stream carefully, with each sub-system and component tested and repaired if necessary.”

“There have been no show-stoppers so far,” added Evans. “For a machine of this complexity, things are going remarkably smoothly and we’re all looking forward to doing physics with the LHC next summer. If for any reason we have to warm up a sector, though,” he cautioned, “we’ll be looking at the end of summer rather than the beginning.”

Source: CERN

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