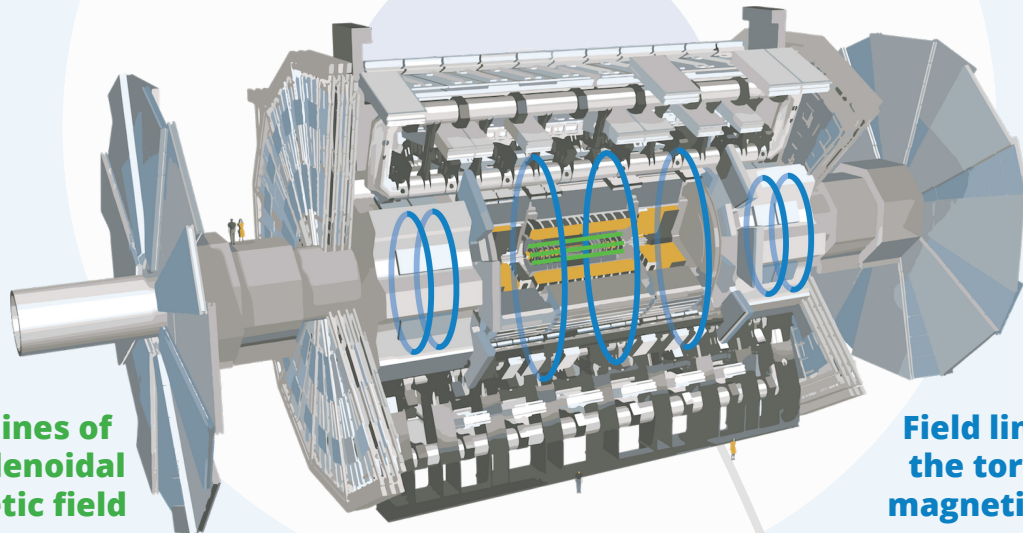


MAGNET SYSTEM

ATLAS uses two different types of superconducting magnet systems – solenoidal and toroidal. When cooled to about 4.5 K (-268°C), these are able to provide strong magnetic fields that bend the trajectories of charged particles. This allows physicists to measure their momentum and charge.



Field lines of the solenoidal magnetic field

Field lines of the toroidal magnetic field

CENTRAL SOLENOID MAGNET



The ATLAS solenoid surrounds the inner detector at the core of the experiment. This powerful magnet is 5.6 m long, 2.56 m in diameter and weighs over 5 tonnes. **It provides a 2 Tesla magnetic field in just 4.5 cm thickness.** This is achieved by embedding over 9 km of niobium-titanium superconductor wires into strengthened, pure aluminum strips, thus minimising possible interactions between the magnet and the particles being studied.

TOROID MAGNET

The ATLAS toroids use a series of eight coils to provide a magnetic field of up to 3.5 Tesla, used to measure the momentum of muons. There are **three toroid magnets** in ATLAS: two at the ends of the experiment, and one massive toroid surrounding the centre of the experiment.

At 25.3 m in length, the central toroid is the **largest toroidal magnet ever constructed** and is an iconic element of ATLAS. It uses over 56 km of superconducting wire and weighs about 830 tonnes. The end-cap toroids extend the magnetic field to particles leaving the detector close to the beam pipe. Each end-cap is 10.7 m in diameter and weighs 240 tonnes.

