# About the ATLAS Inner Tracker

ATLAS EXPERIMENT

SLAC NATIONAL ACCELERATOR LABORATORY

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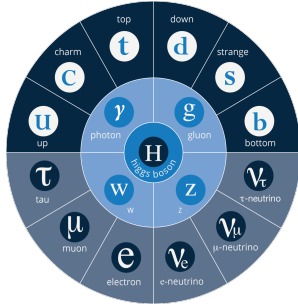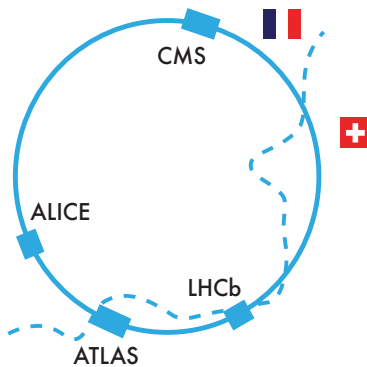## Particle Physics

studies the fundamental particles in nature. We can study these particles and how they interact with eachother to learn about the basic building blocks of our universe.

## The Large Hadron Collider is a 27 km long particle collider that collides protons at the highest human-made energies.

## The ATLAS Detector is one of four large, general purpose particle detectors at the Large Hadron Collider. It is over 6 stories tall!
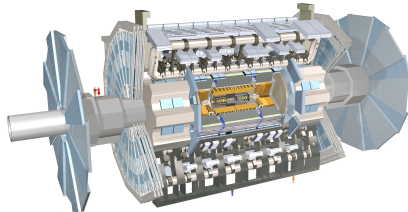
## Detector basics:

Each section of the detector specializes in detecting different types of particles coming from a collision:

muon spectrometer: muons

hadronic calorimeter: hadrons (particles that contain quarks)

electromagnetic calorimeter: photons and electrons

tracking detector: charged particles

**The tracker is the heart of the ATLAS detector.** At SLAC National Accelerator Laboratory we are building the innermost layers of a new upgraded tracker for ATLAS. Once built, the inner layers will be flown to CERN where they will be integrated into the new inner tracker. The entire system will replace the current tracker allowing us to take data at a higher rate than ever before!

## The Tracker

The tracker is made of layers of silicon sensors. The sensors record when a charged particle passes through them. By stitching together the signals they record, we can reconstruct 'tracks' where particles went in our detector. Charged particles in a magnetic field bend differently depending on their charge, mass and momentum. We can use these signatures to learn about the particles produced in our detector.

Higher momentum charged particles curve less than lower momentum ones.
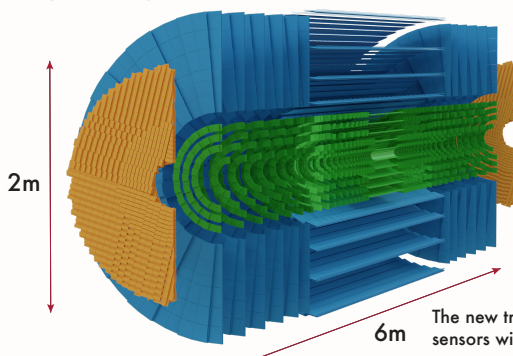
Negatively charged and positively charged particles curve in opposite directions in the magnetic field.

2m

6m

The new tracker will have 170m² of silicon sensors with ~5 billion readout channels!