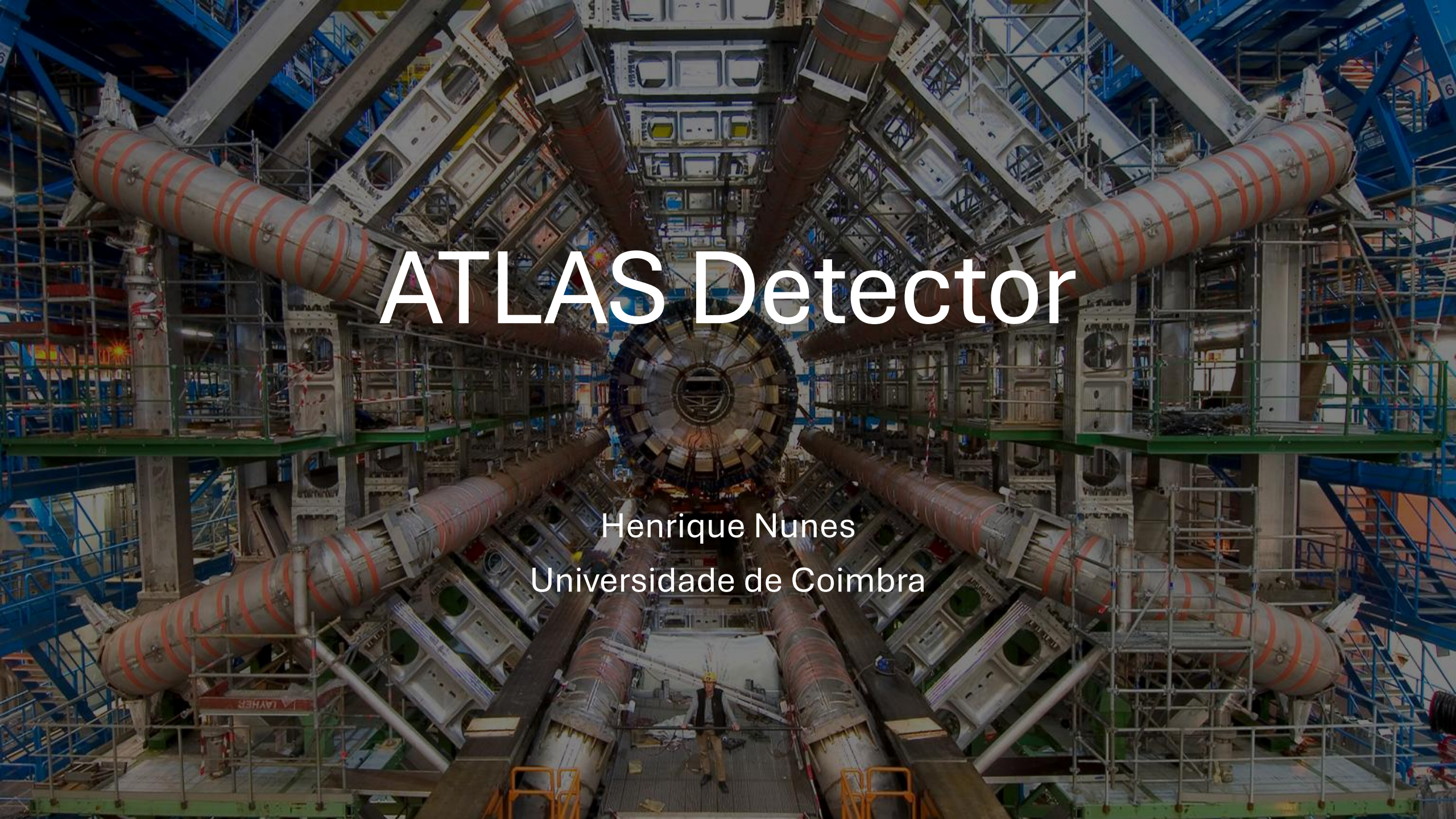


ATLAS Detector

Henrique Nunes

Universidade de Coimbra

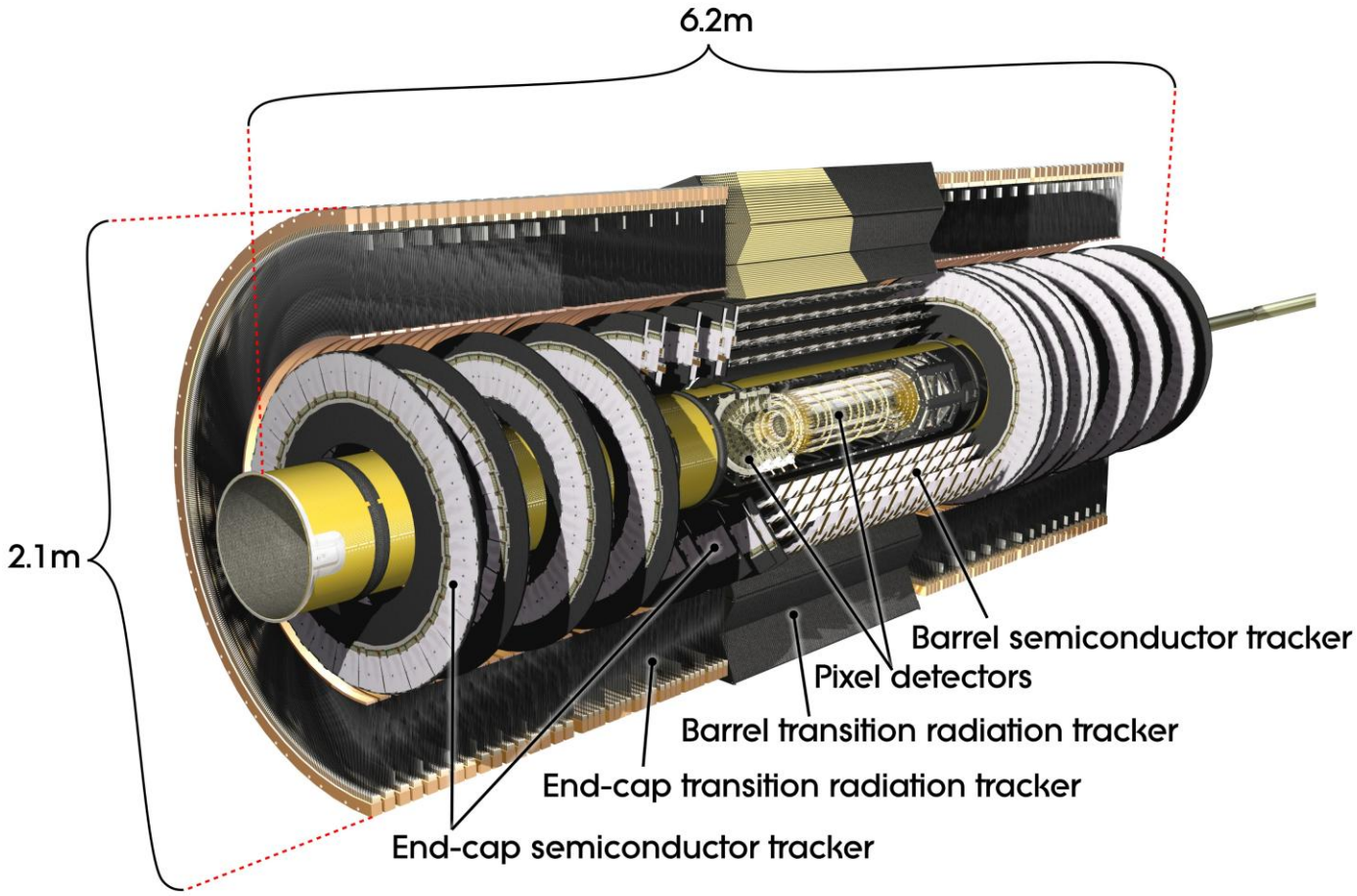
ATLAS Detector

- 46m long
- 25m diameter
- 7 000 tonnes

- Inner Detector
- Calorimeter
- Muon Spectrometer
- Magnet System

Inner Detector

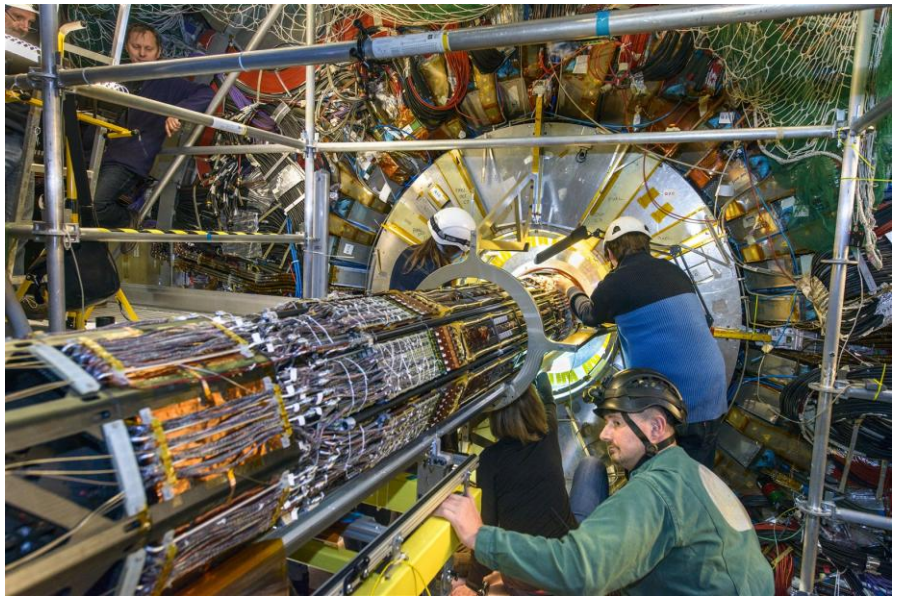
- **Pixel Detector**
- **Semiconductor Tracker** (SCT)
- **Transition Radiation Tracker** (TRT)



Inner Detector

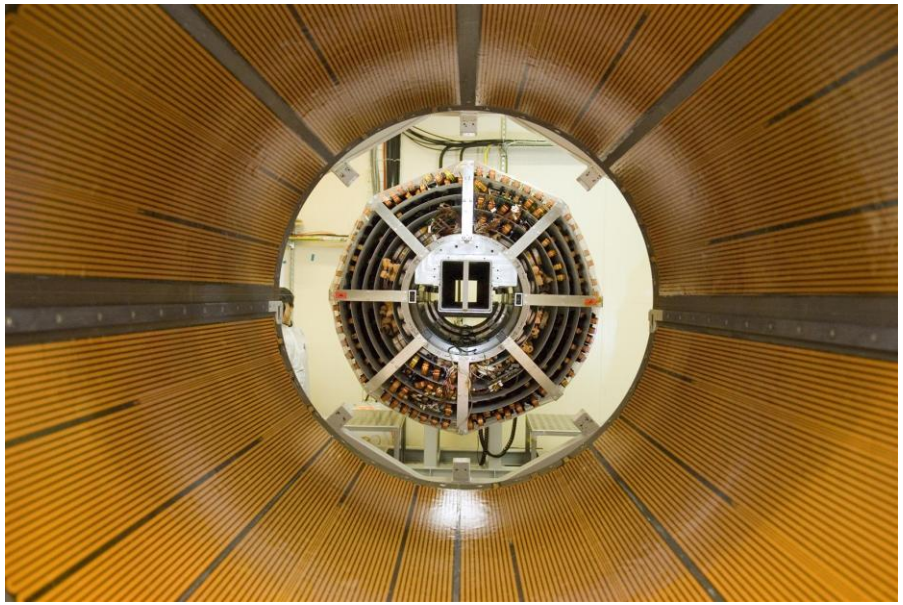
Pixel Detector

- Determine the origin and momentum of the particle
- Precision of almost 10μm



Semiconductor Detector

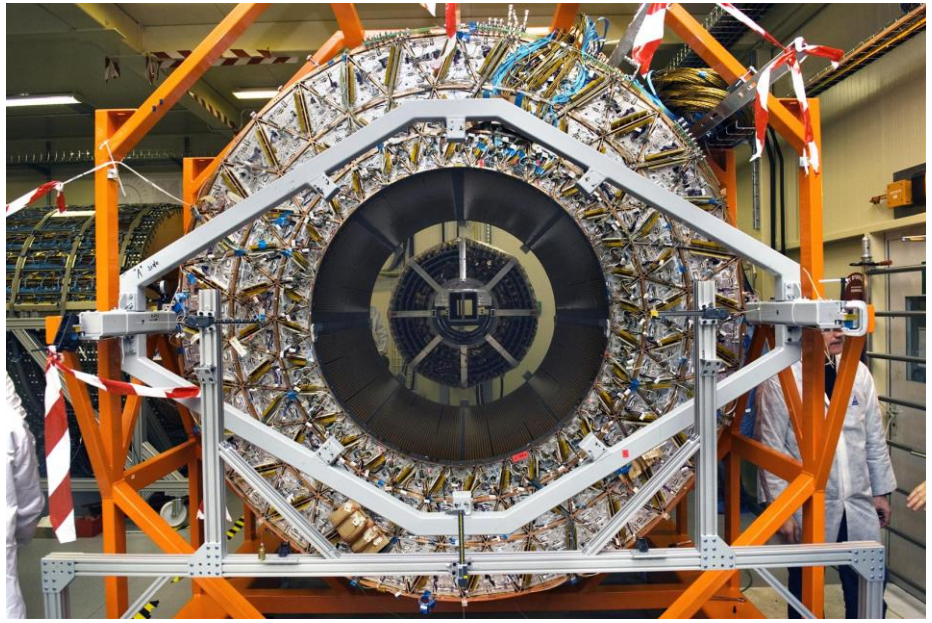
- Detect and reconstruct the tracks of charged particles produced during collisions
- Precision up to 25μm

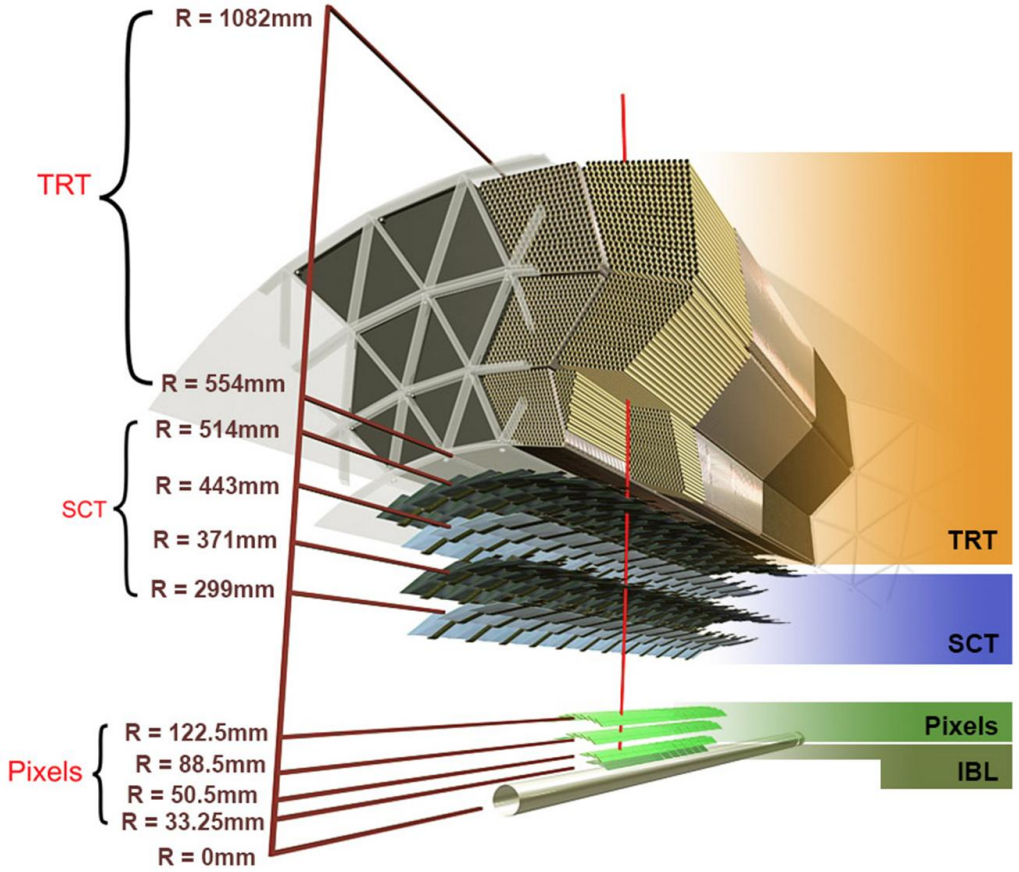


Inner Detector

Transition Radiation Tracker

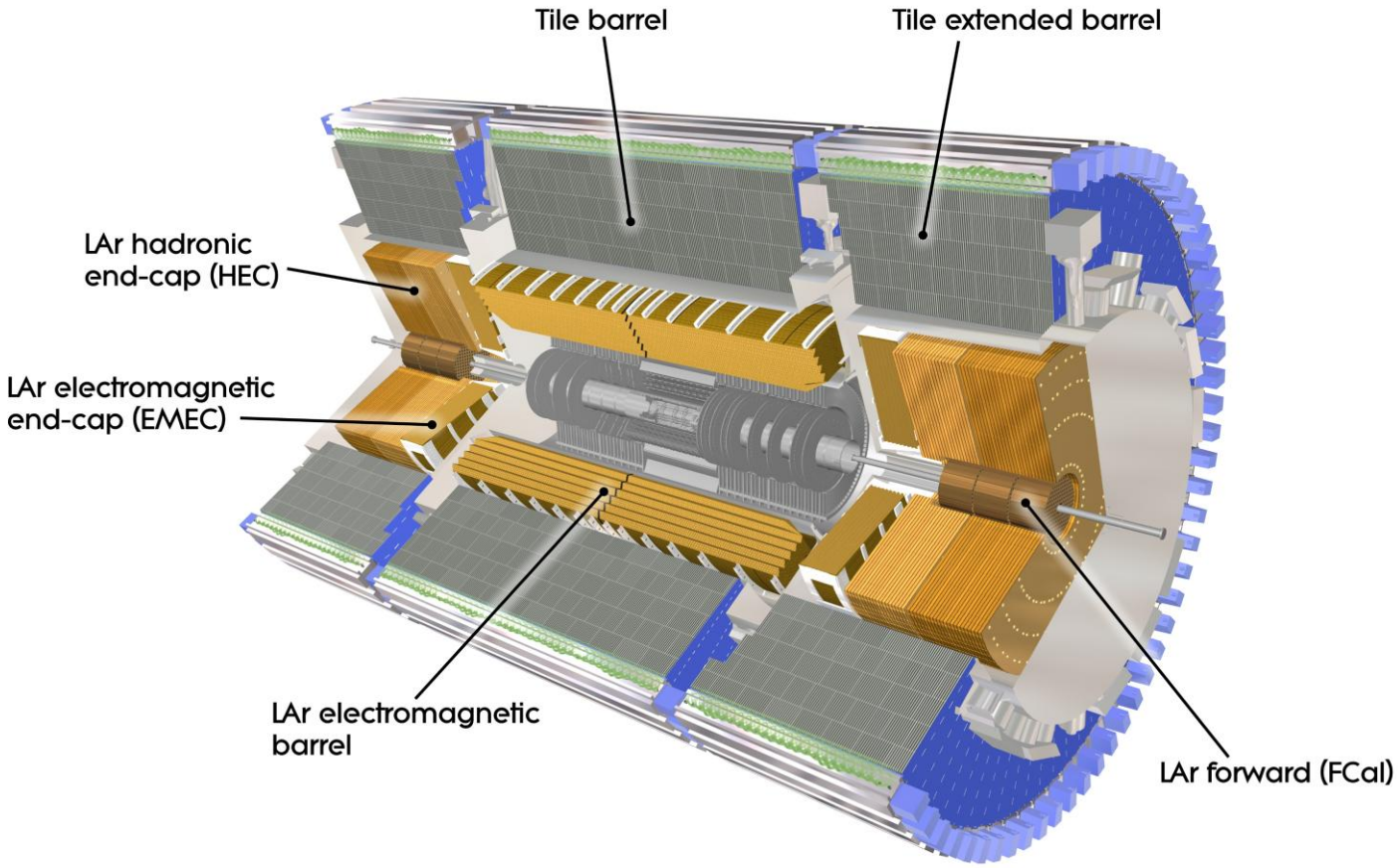
- Provides information on the particle type
- Track reconstruction





Calorimeter

- **Liquid Argon (LAr) Calorimeter**
- **Tile Hadronic Calorimeter**



Calorimeter

Liquid Argon Calorimeter

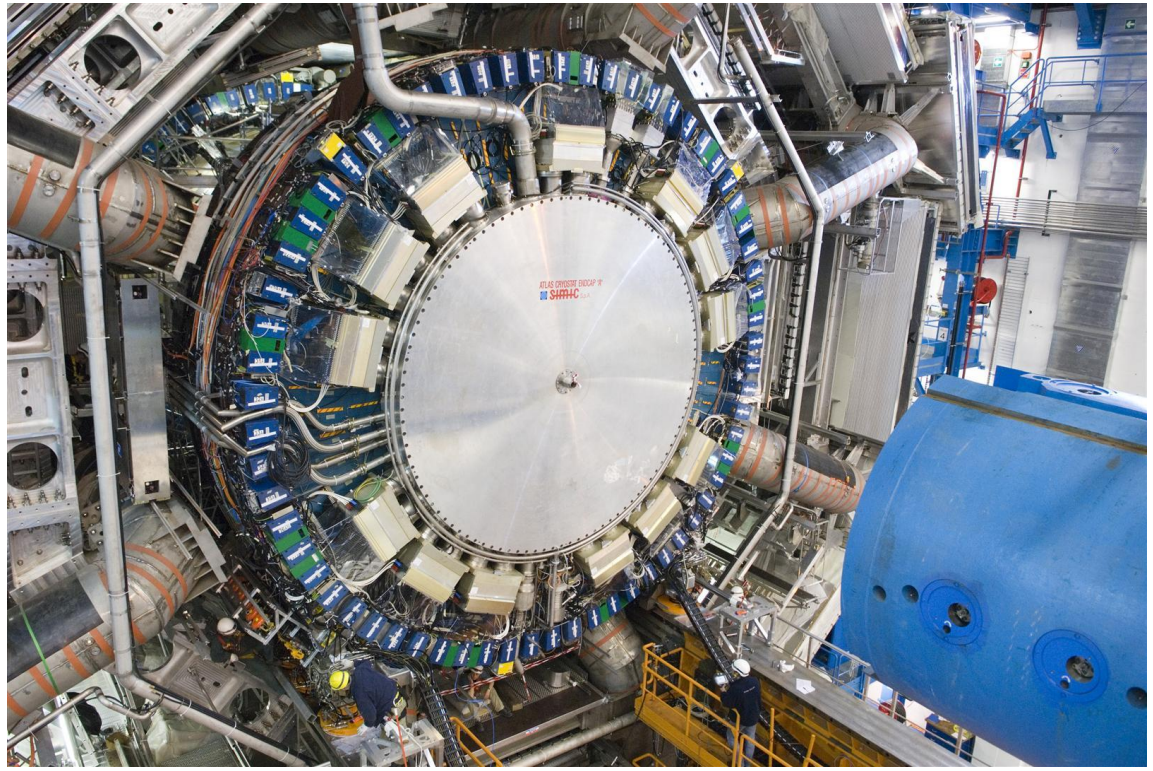
- Features layers of metal (either tungsten, copper or lead) that absorb incoming particles, converting them into a “shower” of new, lower energy particles.

- These particles ionise liquid argon sandwiched between the layers, producing an electric current that is measured.

Calorimeter

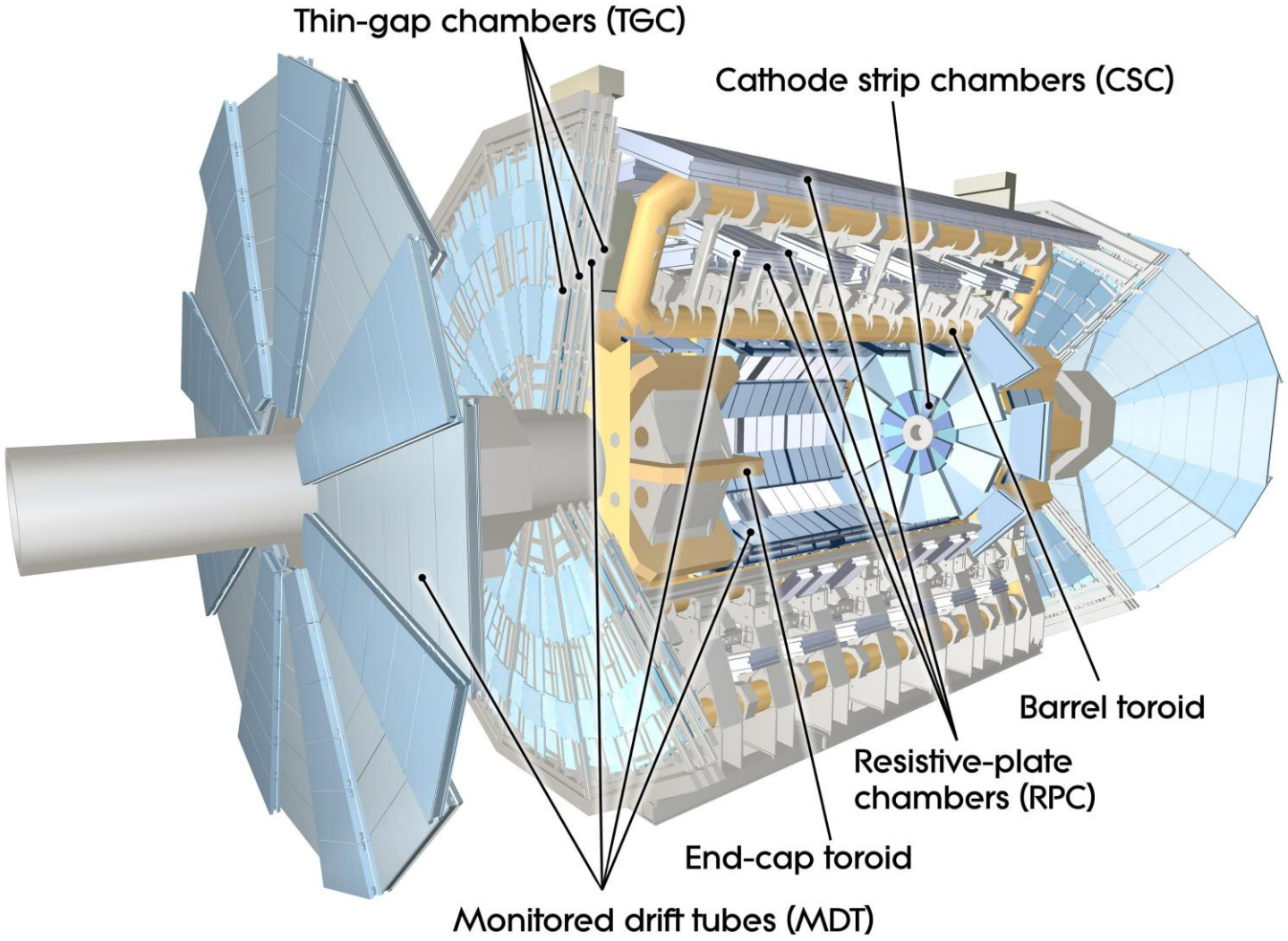
Tile Hadronic Calorimeter

- Measures the energy of hadrons
- Layers of steel and plastic cintillating tiles
- Particles form showers of new particles when they hit the layers of steel
- Plastic scintillators produce photons



Muon Spectrometer

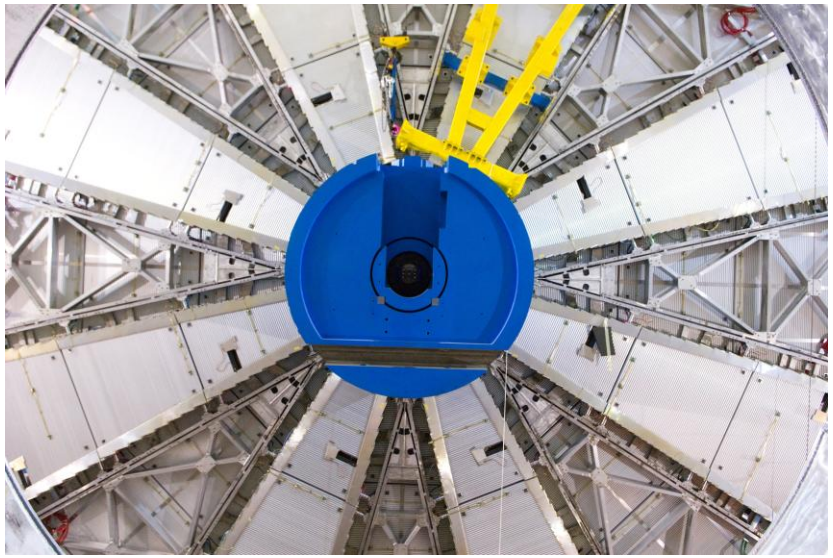
- **Monitored Drift Tubes**
- **Thin Gap Chambers (TGC's)**
- **Resistive Plate Chambers (RPC's)**
- **Small-Strip Thin-Gap Chambers**
- **Micromegas**



Muon Spectrometer

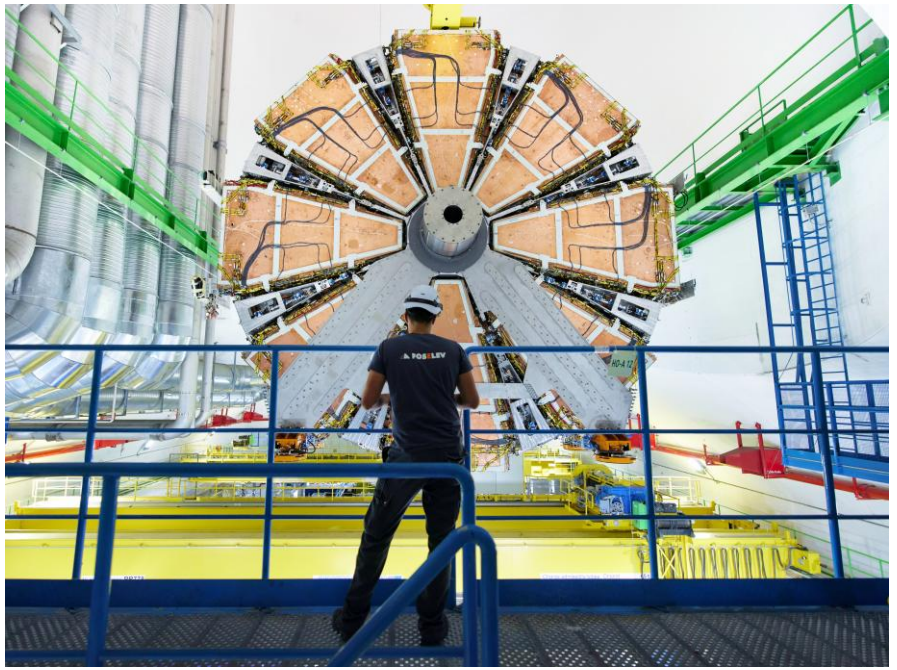
Monitored Drift Tubes

- Muons pass through aluminium tubes filled with a gas mixture, knocking electrons out of the gas.
- These then drift to a wire at the tube's centre to induce a signal.



Micromegas

- Can track muons in high-density areas on either side of the experiment.



Muon Spectrometer

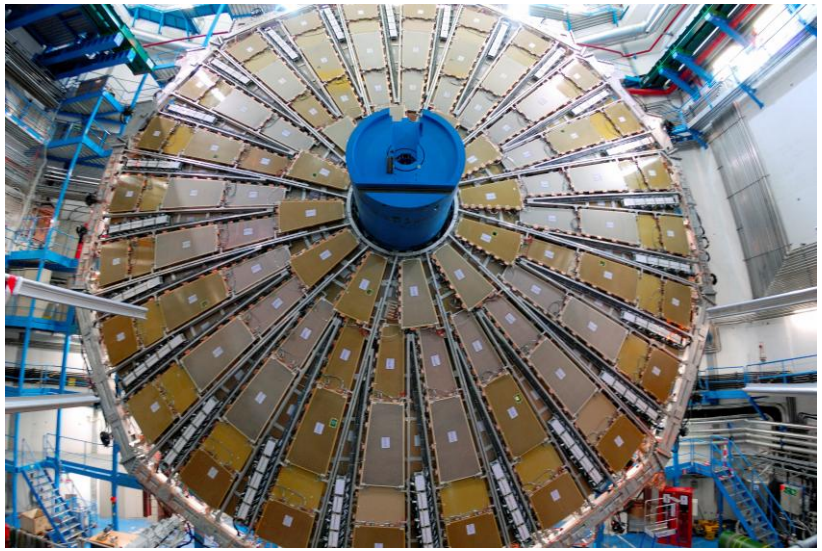
Thin Gap Chambers

- Parallel 30 μm wires in a gas mixture.

Resistive Plate Chambers

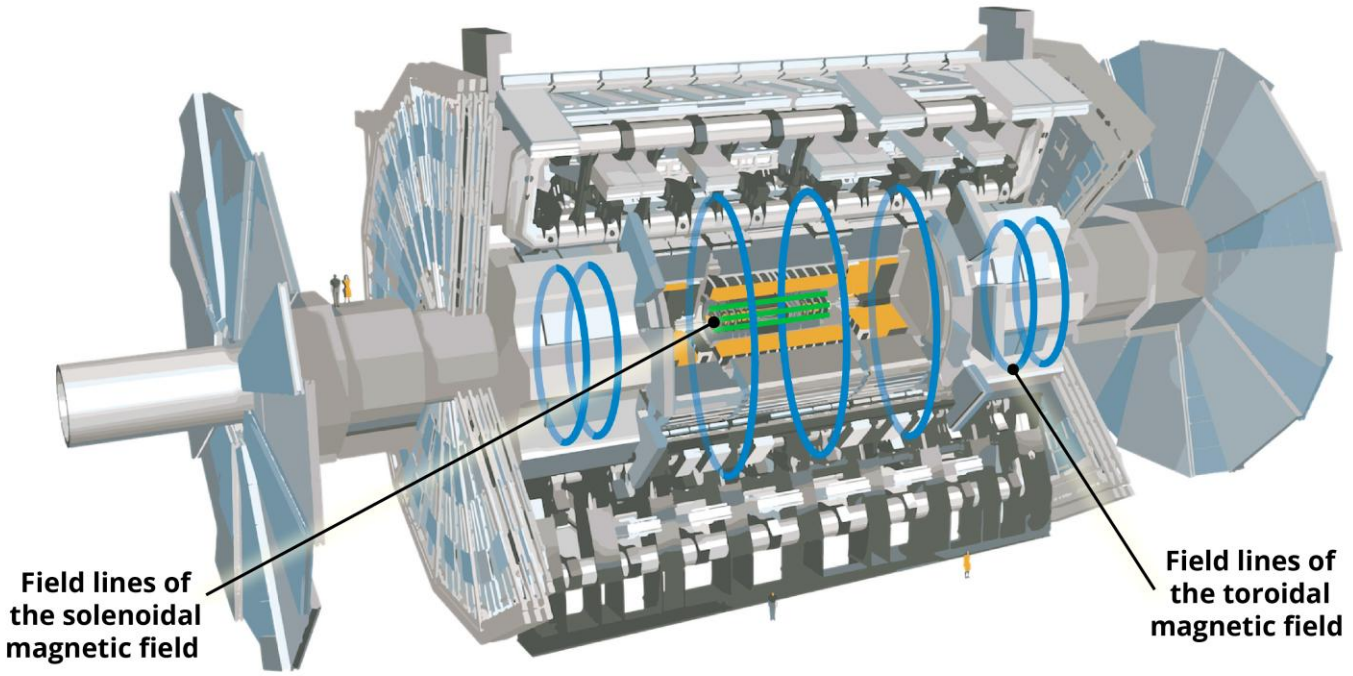
- Pairs of parallel plastic plates at an electric potential difference, separated by a gas volume.

➢ Both chambers detect muons when they ionise the gas mixture and generate a signal



Magnet System

- **Central Solenoid Magnet**
- **Barrel Toroid**
- **End-cap Toroids**



Magnet System

Central Solenoid Magnet

- 2 T magnetic field

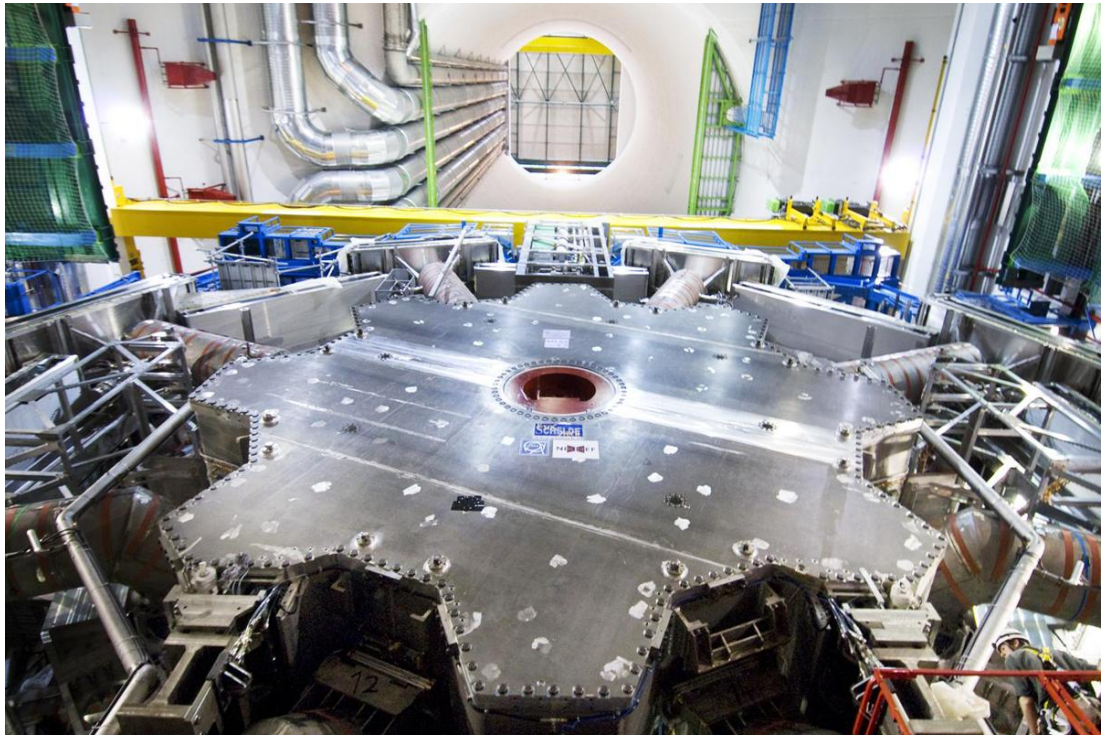
Barrel Toroid Magnet

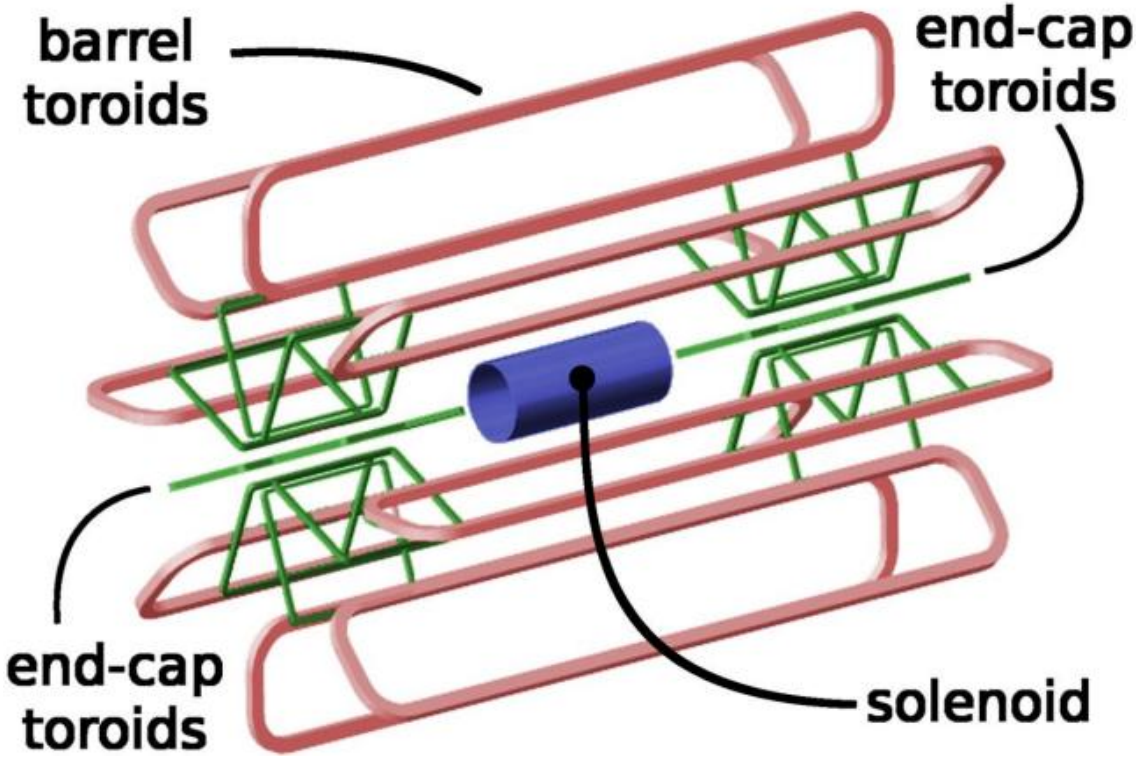
- 4 T magnetic field

Magnet System

End-cap Toroid

- 4 T magnetic field





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- https://atlas.cern/Discover/Detector