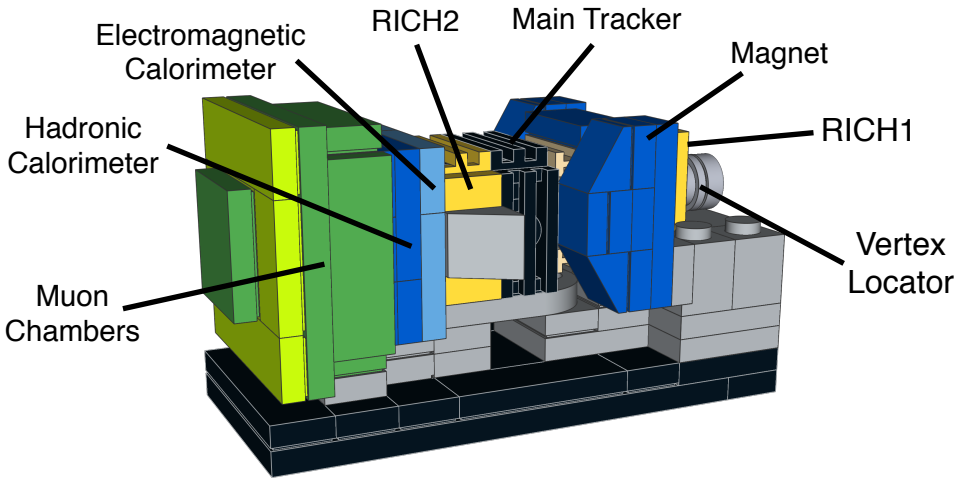
The LHCb Detector

Model Designed by Nathan Readioff



LHCb is a particle detector at the Large Hadron Collider (LHC) in CERN that has been specially designed to investigate the slight differences between the properties of matter and antimatter. It is used to study the decay of particles containing a beauty "b" quark, to try and understand why the Universe now contains only matter.

The LHC is used to accelerate protons up to almost the speed of light and smash them together in the centre of LHCb's Vertex Locator. This is a retractable set of high precision silicon sensors that track the collision debris as it splays out in an expanding cone along the beam pipe.

The RICH detectors identify the type of each particle, and are constructed from "optically slow" materials that allow high energy particles to travel through them faster than light can. This triggers the optical equivalent of a sonic boom, causing the particles to radiate a rich blue light known as Cherenkov radiation.

A powerful dipole magnet is used to make the paths of charged particles bend from straight lines to curves. Their trajectories are then recorded in the main tracker, which contains panels of silicon sensors and thousands of gas-filled straw tubes.

The electromagnetic and hadronic calorimeters are built from alternating layers of metal and plastic scintillators that emit light as particles pass through them. They are used to measure the energy of photons and electrons, and showers of particles made up of quarks and gluons. Finally, a series of five muon chambers are used to observe muons, which are like electrons but 200 times heavier.

LHCb

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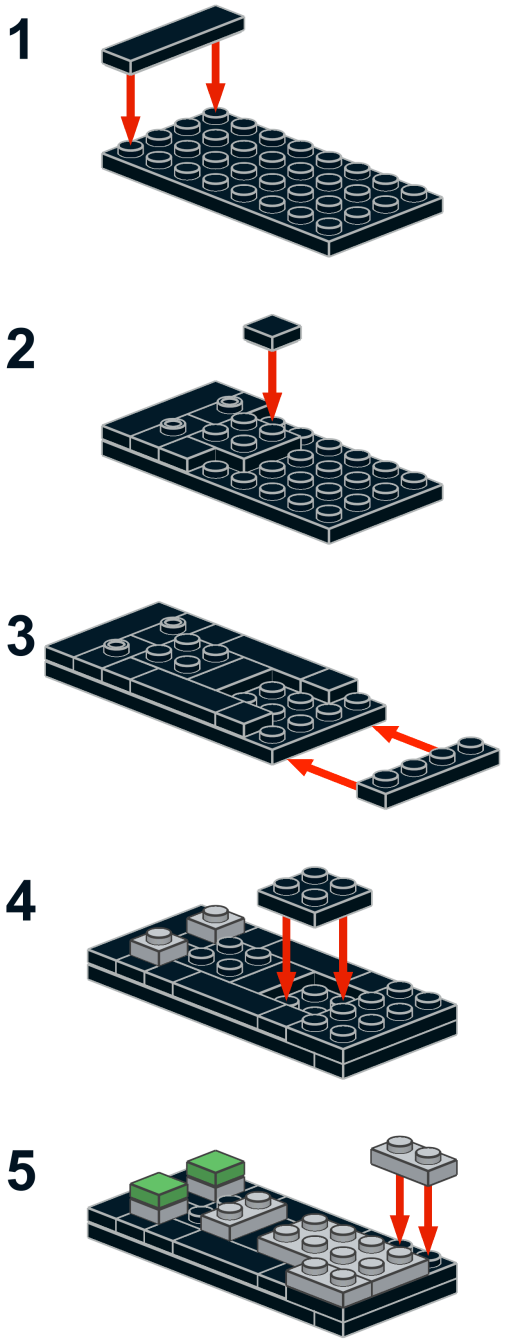

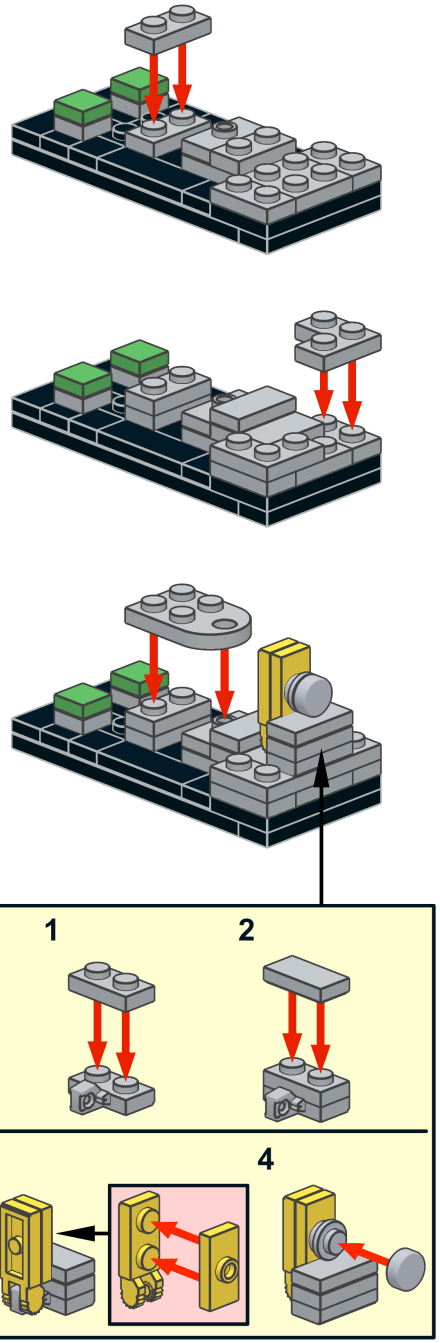

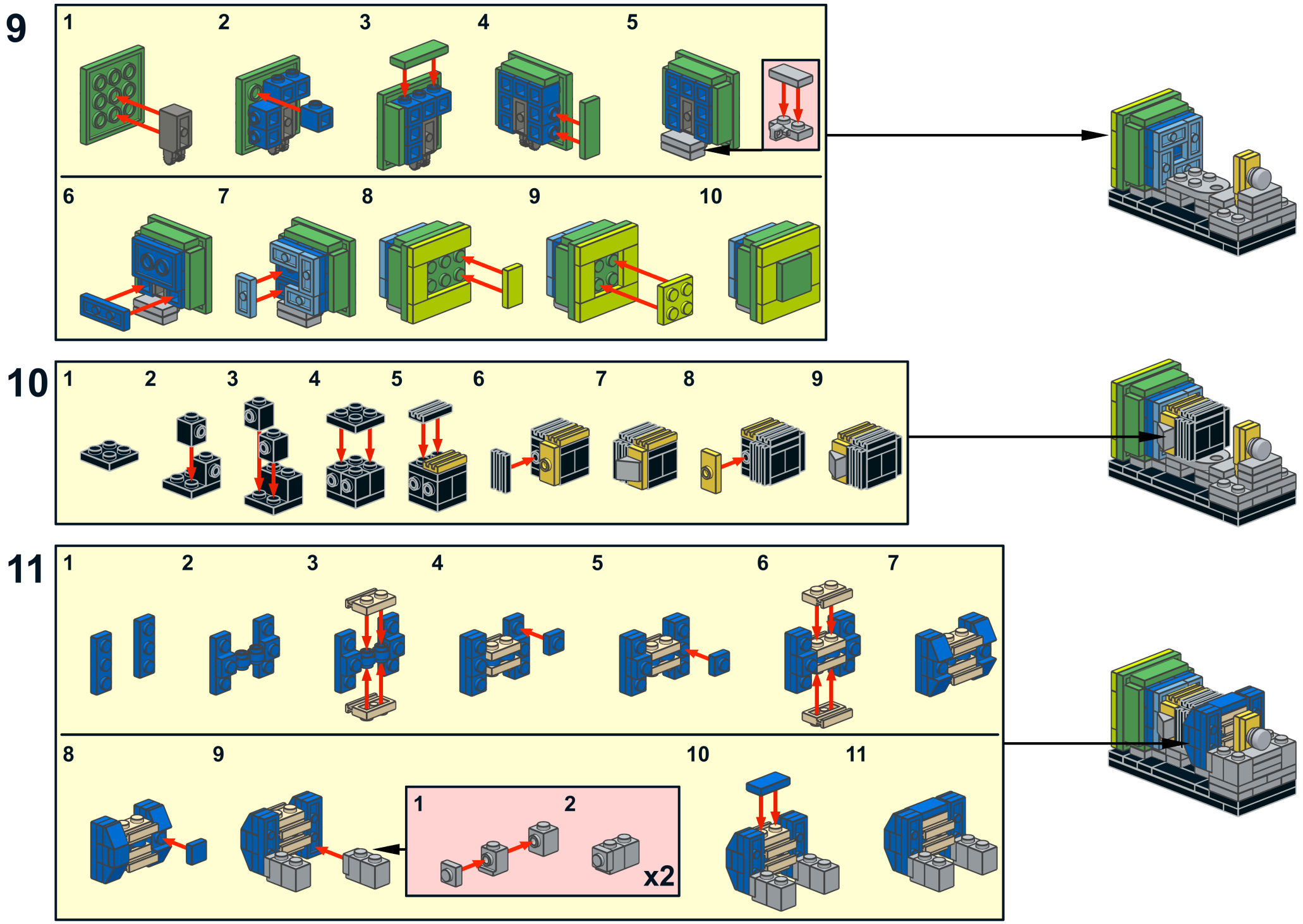
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