

Beauty Quarks

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In News: Beauty quarks or B mesons particles are not decaying as they should and while the findings may warrant “cautious excitement”, more research needs to be done, scientists say.

About Beauty Quarks

- LHCb is one of four big experiments at CERN’s Large Hadron Collider (LHC) near Geneva, Switzerland. As the “b” in the name indicates, it is intended to analyse decays of particles containing one of the six known flavours of quark, the “bottom” or alternatively “beauty” quark.
- B mesons contain elementary particles called beauty quarks, also known as bottom quark.
- The beauty quarks (one of the subtypes of quark) decay into leptons known as ‘muons’.
- Subatomic particles called “beauty quarks”, which are not usually found in nature, undergo a process known as decay, where one particle transforms into several, less massive ones.
- The standard model foresees that “beauty quarks should decay into equal numbers of electron and muon particles. Instead, the process yields more electrons than muons.
- One possible explanation is that an as-yet undiscovered particle known as a leptoquark was involved in the decay process and made it easier to produce electrons.

The Large Hadron Collider beauty (LHCb)

- Experiment specializes in investigating the slight differences between matter and antimatter by studying a type of particle called the “beauty quark”, or “b quark”.
- Instead of surrounding the entire collision point with an enclosed detector as do ATLAS and CMS, the LHCb

experiment uses a series of sub detectors to detect mainly forward particles – those thrown forwards by the collision in one direction.

- The first sub detector is mounted close to the collision point, with the others following one behind the other over a length of 20 metres.
- An abundance of different types of quark are created by the LHC before they decay quickly into other forms.
- To catch the b quarks, LHCb has developed sophisticated movable tracking detectors close to the path of the beams circling in the LHC.
- The 5600-tonne LHCb detector is made up of a forward spectrometer and planar detectors. It is 21 metres long, 10 metres high and 13 metres wide, and sits 100 metres below ground near the village of Ferney-Voltaire, France.
- About 700 scientists from 66 different institutes and universities make up the LHCb collaboration .

CERN

- Physicists and engineers at CERN use the world's largest and most complex scientific instruments to study the basic constituents of matter – fundamental particles.
- Subatomic particles are made to collide together at close to the speed of light.
- The process gives us clues about how the particles interact, and provides insights into the fundamental laws of nature.
- The instruments used at CERN are purpose-built particle accelerators and detectors.
- Accelerators boost beams of particles to high energies before the beams are made to collide with each other or with stationary targets.
- Detectors observe and record the results of these collisions.
- Founded in 1954, the CERN laboratory sits astride the

Franco-Swiss border near Geneva. It was one of Europe's first joint ventures and now has 23 member states.