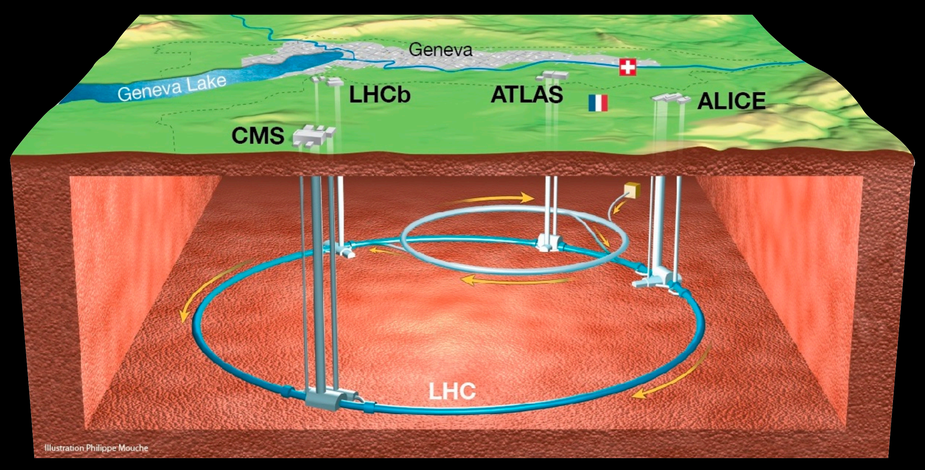
LHCb experiment

School of Physics and Astronomy

MONASH University

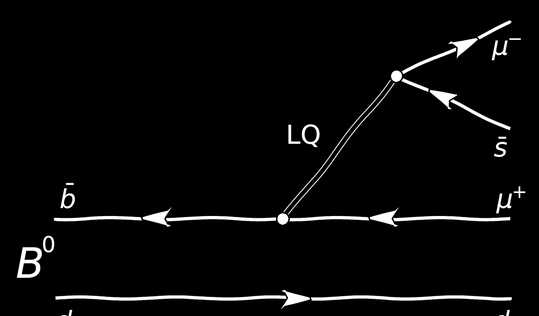
Large Hadron Collider is the **world's largest** particle accelerator



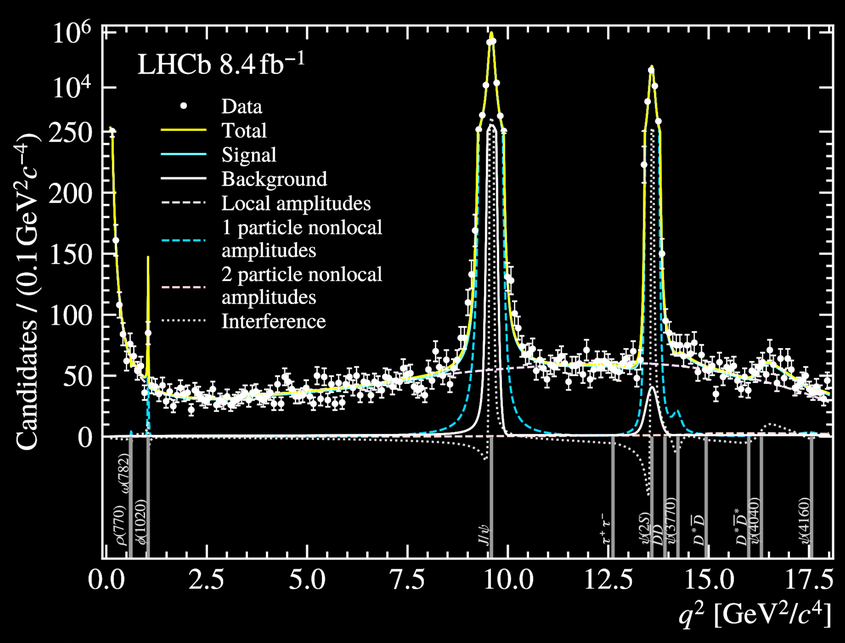
- The LHCb collaboration (~1500 people) studies particles containing ***b*** and ***c*** quarks
- Production and decay of ***b*** and ***c*** quarks help unravel unanswered questions in particle physics

Beyond the Standard Model

- Decays of the *b* quark are influenced by heavy '*virtual*' particles beyond our current reach

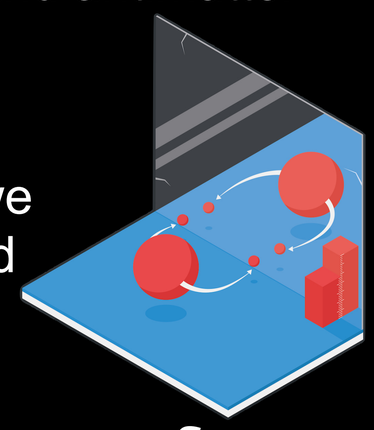


- For example, hypothesised '*leptoquark*' could couple to leptons and quarks, something not allowed in the **Standard Model of Particle Physics**
- Our complex data analysis technique separates different types of virtual particles responsible for the decay



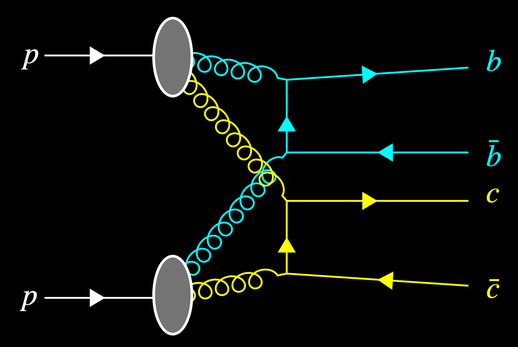
Where's all the antimatter gone?

- Our universe is made of matter, yet the Big Bang predicts equal amounts of matter and antimatter were originally created
- By measuring differences between matter and antimatter at the LHC we help understand why this happened



Understanding the strong force

- The ***b*** *and* ***c*** quarks are **heavy**; they are mainly produced by perurbtative QCD, where the strong force is not so strong



- By studying how multiple heavy quarks end up in a single particle we can probe whats going on deep inside the proton

Building next-gen detectors

- The LHCb experiment will undergo a significant upgrade for the **High-Luminosity LHC** era

- We are developing a **new particle detector** that will help us identify the type of particles produced in high energy collisions

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