The universe was created about 13.7 billion years ago as a very hot, dense and homogeneous "soup" of particles and energy. This event is known as the Big Bang and the "soup" as plasma. From the available energy particles of the matter and its opposite the antimatter were created. When interacting they would annihilate and produce energy once again. At one point in time there was a perfect balance between matter and antimatter. Shortly after creation the particles and antiparticles gained their characteristic masses and something happened that differentiated matter from antimatter. While the universe was cooling down the plasma started to form hadrons, a class of particles including protons and neutrons (the building blocks of atomic nuclei). The particles of matter and antimatter would still annihilate producing photons. If it was not for that small difference between particles and antiparticles a full annihilation would occur. Lucky for us the Nature seems to have a preference for matter. The tiny part of matter that survived to our times forms the know Universe. All astronomic searches for objects composed of antimatter have failed. However we do not fully understand how that happened.

The antimatter is an equivalent of the matter, its mirror image. It is impossible to tell if an object is composed of matter or antimatter until it interacts with known matter. An annihilation will occur and produce energy as a result. Already in 1966 a Russian physicist Andrey Sacharov defined three conditions necessary for the matter to dominate in the Universe. One of them states that there should be a measurable difference between matter and antimatter - the mirror image should be imperfect. Based on observations of interactions of some particles we know that this mirror symmetry is broken in one event per one thousand. On the other hand from other observations we know that this is not enough to explain the existence of our matter Universe.

The LHC accelerator is able to speed up particles to incredibly high energies allowing a recreation of the moment in time just after the creation of the Universe. In such conditions the particles known as beauty quarks and anti-quarks are produced in pairs with a high rate. The LHCb detector registers around one trillion of beauty quarks and anti-quarks per day with an excellent precision. The goal of the experiment is to study the asymmetry between beauty quarks and their mirror image. A discovery of an asymmetry increase over what is predicted by theoretical calculations would help explain why Nature prefers matter over anti-matter.