MYSTERIES

Recent years have seen huge progress in understanding our universe. However the matter we know so well is only 5% of what is out there! Astronomical observations show the universe is dominated by unknown ingredients – dark matter and dark energy. Experiments at the LHC look for evidence of new particles, to help understand more about this mysterious 95%.

Fundamental questions also remain about the very beginnings of the universe. Antimatter, a mirror image of ordinary matter, should have made up half the early universe, before annihilating perfectly with matter to leave just energy. But this is manifestly not the case. Why? CERN experiments are looking for slight asymmetries – imperfections in the mirror image – that would explain this domination of matter.

Another mystery surrounds the most familiar force in our everyday lives – gravity. Fitting gravity into the framework of the Standard Model has proved a difficult challenge. The quantum theory used to describe the micro-world, and the general theory of relativity used to describe the larger scales on which gravity dominates, are difficult to combine.

These, and other such mysteries set the direction of our exploration of the universe, but the door is always left open to surprises.

Photo credit: CERN