

*Ex. 1, p. 141, orally*

- a) What kind of fields exist in quantum physics?

There exist matter fields and force fields.

- b) Why is the Higgs field so important for the Standard Model?

It is important because it produces masses of fundamental particles. Without it, everything would move at the speed of light.

- c) What is the difference between the Higgs field and other fields in physics?

The difference is that the Higgs field never leaves the space-time completely, it is always there.

- d) How does the quantum mechanism discovered by F. Englert and P. Higgs provide a way for symmetry to both exist and be hidden from view at the same time?

This mechanism involves a field that had a perfectly symmetric state immediately after the Big Bang but has then decayed to a lower energy state and lost its symmetry.

- e) How do the ATLAS and CMS detectors function?

These detectors observe proton collisions at the LHC and try to register as much particles as possible. They are then combined to resolve the initial set of particles produced in the collision, some of which may be new to physics.

- f) Why is the Higgs particle not the final key to the Standard Model?

There are other puzzles in physics that are not explained in the Standard Model. Some of them are masses of neutrinos and dark matter.