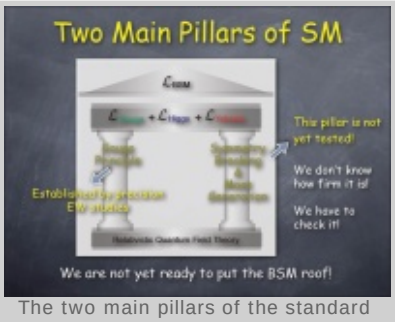
ILC physics subgroup meeting at KEK

Today's issue features a story from Keisuku Fujii, a particle physicist, who is a member of the ILC group in KEK.

On May 31 we had a meeting of our ILC physics subgroup, which is a mixture of experimentalists and theorists working in Japan. The meeting was the fifth in a series that started about a year ago, and each time 20 to 30 people got together to monitor and discuss the direction of the subgroup's activities. The primary task of the subgroup is to reexamine the ILC physics in the context of the expected LHC results and to further strengthen the physics case for the ILC project.

We know that the standard model of elementary particle physics is based on relativistic quantum field theory with two main pillars, the gauge symmetry and its spontaneous breaking. The first pillar has been firmly established by the numerous experiments in the past decades. The second pillar, the electroweak symmetry breaking mechanism, is, however, left untested. At the centre of this symmetry breaking lies the Higgs boson as predicted in the standard model. We believe it fills our space-time and gives mass to every fundamental particle.



The two main pillars of the standard model.

The current data indicate the existence of a Higgs particle below 160 GeV and we hope that the LHC is going to find it. Once a Higgs-like particle is found, it is extremely important to study it in detail and check if it really is the Higgs field (and particle) that is responsible for symmetry breaking and mass generation. We need to study the force that makes the Higgs boson condense in the vacuum and the force that acts as the resistance to matter particles moving in the sea of the Higgs field, thereby giving each of them a mass proportional to the strength of the force. The first most important mission of the ILC is to study these forces so as to establish the second pillar of the standard model.

The ILC physics subgroup focuses its attention on this very important issue since it is a central motivation for the ILC and is crucial whatever new physics is going to be found at the LHC. New physics beyond the standard model is the roof we can put only after we establish both of the two main pillars of standard model. We need the ILC to carry out this mission.

-- Keisuke Fujii