Contribution ID: **68** Type: **not specified**

The Higgs Boson : From Theory to Experiment (TH Colloquium)

Wednesday 23 October 2024 14:00 (1 hour)

The discovery of the Higgs boson in July 2012 was the highlight of an incredible journey in High Energy Physics. The Higgs field was postulated as the minimal addition to the Standard Model (SM) fermion and gauge boson field content, allowing to provide masses to all known fundamental particle in a gauge invariant way.

The scale of these masses is given by the Higgs field vacuum expectation value and the hierarchy of masses is dictated by the couplings of these particles to the Higgs boson.

The Higgs boson mass was anticipated by precision electroweak measurements, and the LHC has now studied its production and decay rates in many different channels, finding amazing consistency with this picture.

Apart from being the only known fundamental spin zero particle, the Higgs boson has,several fascinating properties: its couplings are flavor diagonal even under the presence of arbitrary complex Yukawas, its mass is proportional to its self-coupling and the associated Higgs field vacuum expectation value is unstable under the presence of new heavy fermion or scalar sectors.
This implies some rigidity in the construction of natural extensions of the minimal Higgs picture, as well as some mystery regarding the scale of the Higgs vacuum expectation value.

I will discuss these questions, the efforts to go beyond the SM picture and
the relevant experimental program designed to study the properties of this fascinating particle and the associated Higgs field potential.

This talk is given as part of the “TH colloquia” seminar series – see https://indico.cern.ch/event/1394014/

Presenter: WAGNER, Carlos E.M. (The University of Chicago)

Session Classification: TH Colloquium