

10/11/15

M2 INTERNSHIP PROPOSAL: HIGGS BOSON WIDTH MEASUREMENT AT CMS WITH 2015 DATA

1. HIGGS WIDTH MEASUREMENT AT CMS

After the discovery of the Higgs boson in 2012, the physics community has dedicated an important effort to the measurement of the properties of the new particle in order to understand how the Standard Model can be extended and to gain insight on new physics.

The decay width of the Higgs boson is a fundamental property of the new particle and it is therefore of the utmost importance. Short after the Higgs boson discovery, it was noticed that the off-shell Higgs production can be used to put constraints on the Higgs decay width and therefore on yet unknown massive particles. Such method was shown to allow to constrain the value of the Higgs width 1000 times better than what is possible from direct measurements.

2. INTERNSHIP DETAILS

The selected candidate will be asked to perform the measurement of the off-shell Higgs \rightarrow ZZ production cross-section and of the Higgs width on the data collected by CMS in 2015. Given the higher energy reached by the LHC the measurement is expected to be competitive with the older results and it is one of the most awaited measurements from the 2015 CMS data taking. This extremely important study will be part of CMS official analyses. The student will profit of the whole CMS LLR group and in particular of several researchers who led the Higgs width measurement in 2014 and will collaborate with other researcher in CMS. The internship will start around April 2016 and will be structured as follow:

- Preparation of the 2015 data analysis
- Measurement of the Higgs to ZZ off-shell cross-section
- Measurement of the Higgs width
- Combination of the measurement with 2014 results

3. PRACTICAL INFORMATIONS

The internship will be hosted at the Laboratoire Leprince-Ringuet at Ecole Polytechnique under the supervision of Dr. Giacomo Ortona.

Housing facilities can be available at the Ecole Polytechnique if needed.

Good knowledge of C++ and English are welcome.

Contact and informations: ortona@llr.in2p3.fr