LPC Workshop on Gauge Boson Couplings

Dates: August 19–21, 2013

Outline:

The aim of the workshop is to bring together experimental and theoretical researchers that work in the area of gauge boson couplings. The timing of the workshop toward the end of summer 2013 is ideal.

Given the recent discovery of a Higgs-like particle, there is renewed interest in the status of our understanding of electroweak symmetry breaking, especially the triple and quadratic gauge boson couplings which are directly sensitive to Higgs couplings. The Large Hadron Collider (LHC) has ended its run-I data collection phase, collecting about 25 fb^{-1} in both ATLAS and CMS. In the following two years, a scheduled shutdown will allow to increase the energy of the proton collisions at the LHC to 13 TeV. While many of the current results constraining gauge and Higgs boson couplings will be delivered during this summer, more precise measurements of quartic couplings and WW scattering will need 13 TeV data. This makes the proposed workshop at LPC ideally placed time-wise, as a venue to discuss the results and their implications for the next LHC run starting in 2015.

The final format of the workshop will be tailored to have a roughly equal split between experimental and theoretical talks. The first day of the workshop will be open while the next two days will be restricted to CMS collaborators only. Special attention will be paid to prospective vector boson fusion (VBF) measurements related to Higgs couplings. In addition, the workshop is aimed to provide a broad overview of the latest results on diboson and triboson production, VBF production of single gauge boson and diboson, unitarization of WW scattering, anomalous gauge and Higgs couplings, and improved understanding of background processes including better description of standard model diboson+jets and ttbar with forward jets.

Preliminary Program:

We will allow flexibility in adjusting the program in anticipation of the potential experimental results that come out this summer.

Monday, August 19 - Wednesday, August 21, 2013

Monday - Day 1 (Open Session)
Morning Session 1: Present and Future - overview of theory and experiments
Morning Session 2: Constraints on anomalous gauge couplings in the presence of a light Higgs boson of mass 125 GeV. Gauge couplings in the Standard Model and simple extensions of gauge sector via dimension 6 and dimension 8 operators, unitarization procedure.
Afternoon Session 1: WW production via VBF, WW scattering.
Afternoon Session 2: Description of standard model diboson+jets and ttbar with forward jets. Interference between anomalous signal and the standard model background.

Tuesday - Day 2 (CMS only)
Morning Session 1: Experimental results on triple gauge couplings, VBF production of single and dibson events.
Morning Session 2: Constraints on quartic couplings, WW scattering.
Afternoon Session 1: Prospects of measuring multi-boson (>2) production at 8 TeV and 13 TeV.
Afternoon Session 2: New Physics models. High mass WW, WZ, and ZZ resonances and anomalous couplings

Wednesday - Day 3 (CMS only)
Morning Session 1: Experimental tools to measure and/or set limits on gauge couplings. Combining measurements from various channels and with other experiments.
Morning Session 2: Combining Higgs results with direct anomalous coupling measurements using a single consistent framework.

Afternoon Session 1: MC generation and simulation of signal samples: aTGC, aQGC, VBF W/Z, VBF WW, Wγγ, WWγ, WWZ. Issues of form factors and unitarity bounds.
Afternoon Session 2: Background simulation, especially diboson+jets and ttbar+jets. Empirical determination of background. Modeling of forward jets in VBF events.

Organizers:

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Registration fee:

Not sure if we need it or not. TBD.

Social event:

Plan to take participants to the nearby Two Brothers Brewery. Everyone will pay their own tab. TBD.

Possible Key Speakers and Key Participants:

Jeffrey Berryhill
Vuko Brigljevic
John Campbell
Kingman Cheung
Sekhar Chivukula
Celine Degrande
Oscar Eboli
Keith Ellis
M. Gonzalez-Garcia
Dan Green
Tao Han
Matthew Herndon
Shih-Chieh Hsu
Qiang Li
Yurii Maravin
Konstantin Matchev
Steve Mrenna
Michael Rauch
Jürgen Reuter
Juan Rojo
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Dieter Zeppenfeld