Curriculum Vitae

Personal Data

Name:	Muhammad Gul
Place and Date of Birth:	Mohmand Agency, Pakistan | 31 March 1985
Marital Status:	Married (two kids)
Current Working Address:	University of Ghent, Belgium
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Education

2018 PhD in High Energy Physics, **University of Ghent**, Belgium
Thesis: The study of heavy higgs (H/A) in the SM $t\bar{t}$ final state using CMS data at 13 TeV ($gg \to A/H \to t\bar{t} \to$ SM particles). The analysis targets the heavy Higgs resonance as well as interference from the SM $t\bar{t}$ with mass range from 400 to 750 GeV in a 100 GeV step. The CMS RPCs Detector controlling and operation in the GIF++ facility at CERN. CMS GEM detectors assembly for Phase-II upgrade at UGhent site.
Advisor: Prof. Dr. Michael Tytgat, Prof. Dr. Didar Dobur

2013 Master in Particle Physics, **Quaid-i-Azam University Islamabad**, Pakistan
Thesis: A Study of Top Quark pair using CMS data at 7 TeV. Calculation of cross sections, decay widths and BRs of SM and BSM higgs using HIGLU and HDECAY programs.
Advisor: Prof. Dr. Hafeez Hoorani

2010 Bachelor in Physics, **Quaid-i-Azam University Islamabad**, Pakistan
Specialized in Physics

Scientific Experience

2014-Present | Physics Analysis:
A search for a heavy Higgs boson decaying into a pair of top quarks is performed in the semileptonic final state using about 36 fb^{-1} of pp collision data collected in 2016. Masses ranging from 400 to 750 GeV are probed, and two pure CP states are considered. The interference with the QCD $t\bar{t}$ production is found to play an important role, and it is taken into account explicitly. Upper limits on couplings of the hypothesized particle to top quarks are reported.

2018 | GEM Detector Assembly:
In view of the CMS experiment Phase-II upgrade, GEM technology has been selected as trigger and tracking system in the forward region of the Muon Spectrometer. Ghent group is participating in the GEM assembly where 30 detectors will be assembled and tested.

2017 | NNLO Cross Section Calculation:
To interpret the results of heavy Higgs in hMSSM, a study has been done for LO & NNLO cross sections calculation using `SusHi` and `Top++` for signal and SM $t\bar{t}$ respectively. The two programs are then cross checked with `MADGRAPH` and the final k-factors calculated as the ratio of LO to NNLO cross sections.

2017 | RPC Muography for 2017B :
A study has been done to find out RPC detectors with efficiency ‹ 90% installed at CMS using 2017B data. In this study the real detector occupancy has been compared to the expected one. It provided a good understanding of the RPCs detector geometry and we fixed some detectors by adjusting the HV and LV threshold.

2014 - 2016 | Detector Operation & Performance:
A dedicated Detector Control System (DCS) has been developed using the WinCC-OA tool to control and monitor the CMS RPC detectors installed at the new CERN Gamma Irradiation Facility (GIF++) and to store the measured parameters data. Preliminary efficiency studies that set the base performance measurements of CMS RPC for starting ageing studies are also presented.

Selected publications

- The CMS Collaboration, "Search for heavy Higgs bosons decaying to a top quark pair at $\sqrt{s}$ = 13 TeV" CMS PAPER HIG-17-027 **(Direct Contribution)**
- Muhammad Gul et al., "Detector control system and efficiency performance for CMS RPC at GIF++", JINST **11** C10013, 2016
  http://dx.doi.org/10.1088/1748-0221/11/10/c10013 **(Main Author)**
- KS. Lee et al., "Radiation tests of real-sized prototype RPCs for the phase-2 upgrade of the CMS Muon System", JINST **11** C08008, 2016
  http://dx.doi.org/10.1088/1748-0221/11/08/c08008
- Fagot Fagot "R&D towards the CMS RPC phase-2 upgrade", JINST **11** C09017, 2016
  http://dx.doi.org/10.1088/1748-0221/11/09/c09017
- Other publications: https://biblio.ugent.be/person/802001614377

Conferences

18 May 2016 | General Scientific Meeting of the Belgian Physical Society, (Belgium)
Poster: The CMS Resistive Plate Chamber setup at the CERN Gamma Irradiation Facility.

21-26 Feb 2016 | XIII Workshop on Resistive Plate Chambers and Related Detectors (RPC2016), (Belgium)
Poster: A Detector Control System for the CMS RPCs at the CERN GIF++.

17-28 Nov 2014 | ICTP-LHC School on LHC Physics, Islamabad (Pakistan)
Talk(Parallel): Higgs Beyound the SM.

5-10 Mar 2012 | ISS2012, Islamabad (Pakistan)
Talk(Parallel): A Study of $t\bar{t}$ system in Muon+Jets channel at $\sqrt{s}$ = 7 TeV with the CMS experiment.

Training and Schools

19-23 Sep 2016	CMSDAS-CMS Data Analysis School 2016-Hamburg DESY (Germany).
28 Aug-09 Sep 2016	BND Summer School in Particle Physics, University of Antwerpen (Belgium).
06-10 Jun 2016	Machine Learning Course at CERN (Switzerland).
25-29 May 2015	INFN School of Statistics, Ischia (Italy).
01-03 Oct 2014	JCOP - Finite State Machines in the JCOP Framework at CERN (Switzerland).
28 Jul-01 Aug 2014	WinCC-OA and JCOP Framework at CERN (Switzerland).
June 25-30 2012	37^{th} International Nathiagali Summer College on Physics and Contemporary Needs, Nathiagali (Pakistan).

Languages

Pashtu:	Mothertongue
Urdu:	Fluent
English:	Fluent
Dutch:	Basic Knowledge
Arabic:	Basic Knowledge

Computer Skills

Basic Knowledge:	Access, Linux, LaTeX
Intermediate Knowledge:	ROOT, C++, python, FORTRAN, Excel, Word, PowerPoint

HEP programs and event Generators

Basic Knowledge: MADGRAPH, SusHi, 2HDMC, Top++, HDECAY, HIGLU

Interests and Activities

Technology, Programming
Books Reading, Traveling
Swimming, Pingpong