January, 2018

Recruitment Committee
Helsinki Institute of Physics,
Finland

Subject: Postdoctoral Researchers at the CMS Experiment in the Helsinki Institute of Physics, Finland

Dear Recruitment Committee,

I am writing you this letter to express my interests for the Postdoctoral Researchers advertised on INSPIRE HEP, I hereby extend my application for the said position at your institute. At the moment I am a PhD student registered at the University of Ghent, Belgium and will be finishing PhD studies by the end of July-August, 2018. During the PhD studies, I was involved in the heavy Higgs searches in $t\bar{t}$ channel. My studies also include research and development of Resistive Plate Chambers for the end-caps of the CMS experiment and the Gaseous Electron Multiplier detectors. A position in your group would be an excellent opportunity for me to continue working in experimental high energy physics without switching to another experiment.

The PhD studies laid an excellent foundation in understanding physics in general and high energy physics in particular. It has helped me to acquire a great deal of knowledge and to understand the huge canvas of experimental high energy physics. During the PhD studies I learnt how to handle various physics objects like jets, leptons, missing transverse energy, Monte Carlo study using MadGraph and Pythia, event simulation (Fast and Full simulation), data-driven estimation of background, cross sections, decay widths and branching ratios calculators like SusHi, Top++, 2HDMC, HDECAY and HIGLU and also Muon-RPCs and GEM detectors and their detector control system based on WinCC-OA.

I also made a significant contribution in a search which involved a heavy Higgs boson decaying into a pair of top quarks in the semileptonic final state. Masses ranging from 400 to 750 GeV are probed, and two pure $\mathcal{CP}$ states are considered. Interestingly, the results come out to be in agreement with the theoretical predictions. The analysis has already been approved and we are working to publish the analysis in the current year.

In the framework of the CMS Phase-II upgrade program, I played a pivotal role in designing the operating system for end-cap RPCs detectors installed in GIF++ (Gamma Irradiation Facility) for long term irradiation tests. The system is based on WinCC-OA and has variety of functionalities, operating and controlling the detectors and archiving the data in a database. This work has been published in `JINST 11 C10013`. I am also taking part in the Muon-GEM detector assembly at the Ghent GEM assembly site where 30 detectors are being assembled for installation during the LHC LS2.

In the long run, I would like to continue working in experimental high energy physics and make

significant contribution in making and developing a strong experimental high energy physics community in my own country. Working in your group would give me a way forward to learn and establish a strong long term collaboration.

I am presently based in Belgium and my expected graduation date is around July, 2018. I will be very happy to discuss my application in more detail during the interview. I hope you will consider my application and I will be given the opportunity to explore my skills and enhance educational spectrum.

Sincerely,

Muhammad Gul

Attachments: Curriculum Vitae, Statement of Research Interests