DEPARTMENT OF PHYSICS
PANJAB UNIVERSITY
CHANDIGARH
SIX-MONTHLY PROGRESS REPORT
PROFORMA FOR Ph.D. CANDIDATES

01.07.2017 to 31.12.2017
(To be submitted bi-annually by June, 30th and December, 31st)

1. Name of the candidate: Anterpreet Kaur
2. Faculty : Science
3. Department : Physics
4. Enrollment No. and Date : 13/1033 , 10-04-2013
5. Registration No. and Date : 4962, 4 February, 2016
6. Tentative/Approved Title : MEASUREMENT OF MULTIJET CROSS-SECTION RATIOS IN PROTON-PROTON COLLISIONS WITH THE CMS DETECTOR AT THE LHC (Approved)
7. A summary of the work done during the last six months (Depending upon the stage of Ph.D. work) providing details of (i) Review of Literature (ii) Experimentation/Data Collection, Field work (iii) Data Processing (iv) Data Analysis and Interpretation and (v) Stage of thesis writing with specific reference to the goals set for the previous 6 months. (Separate sheet attached)
8. Did you complete the tasks and achieve the goals you had set for the period under report ? Yes/No : Yes
   If No : Difficulties, Constraints faced in achieving the objectives that had been formulated for the period under report.
9. Publications if any : N.A.

Certificate :

It is certified that the information provided above is correct to the best of my knowledge. I shall try my best to achieve the above targets during the next six months.

Name of the Candidate : Anterpreet Kaur

Signature :

Certificate:

Progress report of the candidate : Satisfactory/Unsatisfactory/Need to be improved

Supervisor Name : Prof. Manjit Kaur

Signature :

Counter –Signature of the Chairperson

PROGRESS REPORT

I visited Fermi National Accelerator Laboratory (Fermilab), Batavia, Chicago, USA in LPC Guest & Visitor programme for a period of six months from March 20, 2017 to September 14, 2017. I worked on analysis ''**Search for light scalar resonances decaying to b quarks at √s = 13 TeV''** with DAZSLE group. In this analysis, a search is being carried out for boosted scalar or pseudoscalar resonances decaying to b quarks in the mass range from 50-500 GeV produced in association with a high transverse momentum jet using 36.4 fb^{-1} of 2016 at 13 TeV proton-proton collision data collected by Compact Muon Solenoid (CMS) experiment of LHC (Large Hadron Collider). Novel jet substructure and b-tagging methods and background estimation techniques are employed to search for a resonance in the jet mass distribution originating from a new particle in whose decay the b-quarks are merged into a single jet. The results are interpreted in context of scalar model with couplings proportional to Higgs Yukawa couplings. This analysis is documented in the form of CMS Analysis Note : **AN-2016/384** and CMS Physics Analysis Summary (PAS) : **EXO-17-024**. The results were presented to get pre-approved from CMS Collaboration on 11th December, 2017.

I have started thesis writing on the work done in **CMS Collaboration, "Determination of the strong coupling constant from the measurement of inclusive multijet event cross sections in pp collisions at √s = 8 TeV", CMS-PAS-SMP-16-008 (2017).**

Other Activities :

- I presented a plenary talk on "**Measurements of event properties and multi-differential jet cross sections and impact of CMS measurements on Proton Structure and QCD parameters"** at ISMD 2017: XLVII International Symposium on Multiparticle Dynamics, 11-15 Sep 2017, Tlaxcala City (Mexico). The proceedings of this talk will get published on-line on the EPJ Web of Conferences.
- I also worked for software development of a tool called Historic DQM (HDQM) in Data Quality Monitoring (DQM) group of CMS. This tool is beneficial to study and check stability of various sub-detectors with time.
- I took offline **Muon DOC3 Certification Shifts** for three weeks from 19th September, 2017 to 10th October, 2017.

Goals for the next six months :

- To submit the thesis.
- To continue working on analysis AN-16-384.
- To participate in workshops, seminars and to attend academic lectures.

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