

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

01.01.2018 to 06.04.2018

(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 worked in collaboration with the CMS experiment CMS (Compact Muon Solenoid) experiment at CERN, Geneva on “MEASUREMENT OF MULTIJET CROSS-SECTION RATIOS IN PROTON-PROTON COLLISIONS WITH THE CMS DETECTOR AT THE LHC”. In the physics problem, the inclusive 2-jet and 3-jet event cross sections are measured as a function of average transverse momentum (p_T) of two leading jets ($HT,2/2$), for two and more number of jets. The data from the LHC (Large Hadron Collider) proton-proton collisions at center of mass energy of 8 TeV, corresponding to an integrated luminosity of 19.71 fb^{-1} , have been collected with the CMS (Compact Muon Solenoid) detector. Jets are reconstructed with the anti- k_T clustering algorithm for a jet size parameter $R = 0.7$ in a phase space region ranging up to jet transverse momenta p_T of 2.0 TeV and an absolute rapidity of $|\eta| \leq 2.5$. The data are well described by predictions at next-to-leading order (NLO) in perturbative quantum chromodynamics, complemented with NP corrections that are important at low $HT,2/2$. Additionally the results are also compared to several Monte Carlo event generators. The strong coupling constant is determined in a fit to the ratio of 3-jet over 2-jet event cross section (R_{32}) measurement to $\alpha_S(M_Z) = 0.1150 \pm 0.0010 \text{ (exp)} \pm 0.0013 \text{ (PDF)} \pm 0.0015 \text{ (NP)} + 0.0050 - 0.0000 \text{ (scale)}$ using the MSTW2008 Parton Distribution Function set.

During the last six months, I wrote the thesis and submitted on 06.04.2018.

Goals for the next six months :

- I will be presenting a talk on "**Differential jet cross sections at the CMS experiment**" in **DIS2018: XXVI International Workshop on Deep Inelastic Scattering and Related Subjects, 16-20 Apr 2018, Kobe University, Kobe (Japan)**, on behalf of CMS Collaboration.

ANTERPREET KAUR,
DEPARTMENT OF PHYSICS,
PANJAB UNIVERSITY, CHANDIGARH.