

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

01.01.2014 to 30.06.2014

(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 : N.A.
6. Tentative/Approved Title : Synopsis not submitted yet
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

Quantum Chromodynamics (QCD) is the the fundamental theory to describe the strong interactions between the quarks and gluons. In QCD, the partons (quarks and gluons) are produced in hadron-hadron collisions which fragment to produce parton showers. These partons hadronize and get detected as a spray of particles called jets. The study of inclusive jet cross-section measurements are important to test the QCD in hadron colliders. I will be studying the multijet cross-section ratios at centre-of-mass energy of 8 TeV. Using the ntuples provided by the SMP-J group, I have studied the basic distributions of (p_T, η, Φ) of leading jets in the events having at least 3 jets as well as 4 jets. Jets are reconstructed using particle flow technique using the anti kT clustering algorithm with size parameter $R=0.7$. The jets are required to have p_T to be greater than 100 GeV and tight id criteria has been applied to ensure events with clean jets.

Other Activities :

- I was deputed to CERN from 22nd January, 2014 to 19th April, 2014. The Large Hadron Collider (LHC) is shutdown for upgradation in which the proton beam energy will be increased from 4 TeV to 6.5 TeV per beam. During the upgradation, the Hybrid Photon Detectors (HPDs) of Outer Hadron calorimeter (HO) were to be placed by Silicon Photomultipliers (SiPMs). Hence, I participated in the installation of Readout Modules (RMs) with HPDs replaced by SiPMs in HO. The installation process took place for three weeks starting from March 24, 2014. I, along with the HO group, installed different RMs in Sectors YB+1 and YB+2 of HCAL.
- I also participated in taking the runs for Quality Control Analysis in which various runs for e.g. LEDs, Peds, LED_PED_long etc. were taken by the HO group to analyse and studied various properties of SiPMs, now used in place of HPDs. The relative variation in gain with time has been studied for which a code has been developed.
- With the increase in LHC energy & luminosity, a large amount of data has to be processed. So, a very high speed DAQ is needed. But the current VME based system doesn't support data transfer rate which will be needed after LS1 (Long Shutdown). So a μ TCA based system is required which will lead to change of electronics. The Power Mezzanine Testing program is designed to monitor or test μ HTR Power Mezzanine (PM) and Auxiliary Power Mezzanine (APM) for long term stability tests. We have installed a set-up at Department of Physics, Panjab University to test these mezzanines. Each test will be run on 5 mezzanines for 39 hrs. continuously. We have tested one such set successfully.

Goals for the next six months :

- To study the p_T spectrum of inclusive jets at 8 TeV in different rapidity bins and to compare the results with those from Monte Carlo predictions.
- To perform the stability tests for the PMs/APMs for 39 hours per set.
- To work with the HO Upgrade group to study the stability and the Peltier behavior of the SiPMs after their installation.
- To attend various talks and lecture programs that would be helpful for my Ph.D degree.

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