

## **Status of the Laser Stability and Reconstruction.**

This talk focuses on the laser monitoring system in general. The lasers are used to monitor and perform absolute gain corrections of the calorimeter in general. More specifically our system monitors accurately the fluctuations in gain of the calorimeters. On longer timescales, the goal is to keep systematic contributions due to gain fluctuations at the sub-percent level. Tests were performed using beam of laser light equivalent to 1 GeV. We use 6 source monitors (SM) to monitor the 6 laser heads and 24 local monitors (LM) to monitor the calorimeters and the laser sources itself. Each SM has 2 pin diodes and one laser PMT. The PMT monitors the laser light and the Americium source (precisely only one channel sees Am source). Thus in essence we should have 24 channels for the LMs and 18 channels for the SMs, since each of the six SMs use two pin diodes and one PMT.

We have two systems that measure the SM data – one locally in Fermilab using WFDs (the Riders) and MIDAS DAQ and the other remotely in Naples using their custom data acquisition and boards. Their custom boards use a charge integration for their studies. The LM's use our DAQ and Riders at Fermilab itself. The LM's see two pulses due to two fibres – one from the SM and one from the diffuser (which is upstream before the calorimeter).

In this talk we present the comparative studies of the customized Naples system and the Fermilab system for the Source Monitors. Perform some stability tests / checks of both the SM and the LM. The general structure of this dataset is that there is one pulse within a fill and 8 pulses out of fill. Each fill is defined as an event. We do an event by event time evolution studies on a common data set and check the hardware stability and the software consistencies of reconstruction of data and various parameters of a pulse. We check the definitions of the parameters of the pulses like the amplitude, pedestals, areas etc. The definitions of the pulse parameters are based on sums / averages of ADC counts. These will be discussed in detail in the talk. We study correlations between the two pin diodes of each SM and also correlations between the amplitudes of the two pulses of the local monitors etc. The data shows a trend according to the temperature of the laser hut. Finally we also suggest various alternative ways of reconstructing data like definitions based on fitting with a pulse template or finding different algorithms of fitting and finding the peak ADC count of a pulse etc. This is just a preliminary study and these methods are our future plan and have not yet been implemented in this talk.