



Contribution ID: 15

Type: Oral

## Laboratory tests for Diode-Laser based Calibration Systems for Fast Time-of-Flight Systems

*Wednesday 4 June 2014 11:00 (20 minutes)*

Time-of-flight systems, based on scintillators, may reach good intrinsic time resolution, by using fast scintillators and photomultipliers. Examples are the large time-of-flight system constructed for the HARP experiment at CERN PS ( $\sim 150$  ps detector resolution) or the most demanding time-of-flight system of the MICE experiment at RAL ( $\sim 50$ - $60$  ps detector resolution).

This level of intrinsic timing resolutions puts demanding requirements on the laser based calibration system for day by day time monitoring.

Such a system may be realized by splitting a fast laser beam (FWHM  $\sim 30$  ps) to a fast photodiode, giving the START for the TDC system, and injecting the laser light into a system of fibers that transmit the pulse to the individual counters to be calibrated, giving the STOP signal.

Due to the limited power of diode-laser systems (up to 1 W) extreme care must be put to minimize power losses. The choice of the type of optical fiber to be used (multimode vs single-mode) is another critical issue. Step-index multimode fibers have been chosen giving the best trade-off between input power loss minimization and timing properties of the system. Timing characterization was done with a sampling HP54750A scope with a 20 GHz bandwidth. Additional tests to study the temperature dependence of the system components were done with a precision LAUDA PR845 cooling thermostat.

A system based on optical switches, fused fiber splitters and an ultrafast diode-laser will be described, together with the laboratory tests needed to optimize the choice of components and characterize completely the timing performances.

**Author:** Dr BONESINI, Maurizio (Sezione INFN Milano Bicocca)

**Co-authors:** DE BARI, Antonio (Sezione INFN e Università di Pavia); ROSSELLA, Massimo (Sezione INFN Pavia); BERTONI, Roberto (Sezione INFN Milano Bicocca)

**Presenter:** Dr BONESINI, Maurizio (Sezione INFN Milano Bicocca)

**Session Classification:** IV.d Photonics

**Track Classification:** Emerging technologies: 4d) Photonics