

10.02.2003  
H.Taureg

**Production Readiness Review  
of the ALICE TPC Laser System**  
Held at CERN on 27.01.2002

Present: H.Boggild, C.Fabjan, J.J.Gaardhoje, P.Glässel, M.Hoch, W.Klempt,  
T.Meyer, B.S.Nielsen, H.Taureg, J.Westergard

Referees: B.Jean-Marie, O.Ullaland

B.S.Nielsen presented the TPC laser system.

The referees pointed out that even relative measurements of TPC parameters depend on the time stability of the laser or the time stability of the monitoring device for the laser output.

The referees suggested to measure the ionization in the final TPC gas as function of the laser intensity.

The referees asked about the possibility to direct either of the two lasers to the two end plates of the TPC. This possibility is foreseen. Normally, however, one laser will send light to one end plate only and both lasers are operated.

The referees enquired about the loss of intensity at the different optical elements along the light path. These losses are below 1% per element.

They asked about the alignment of the optical elements. The elements on the end plate of the TPC will be aligned manually. Only the first mirror on the end plate will be remotely controllable as well as beam elements between the laser and the TPC end plates. The referees asked about the size of the optical elements, their holders and the required range for adjustment. The sizes are determined by the beam diameter and it seems difficult to reduce them. The range for adjustment is not so clear but a few milliradians should be sufficient.

The referees enquired about the stiffness of the laser rods and possible beam deviations from rod bending. Calculations show that the rods with their intermediate supports should be sufficiently stiff. The referees asked about the effect of humidity on the laser rods.

There are no big effects if the Macrolon tubes are handled following a well-established procedure.

The referees asked if a simpler system with light injection from one side and less beams would fulfill the requirements. Measurements on local effects require a good coverage of the TPC volume and a reduced system would not stand up to the task.

The referees suggested to measure the power reflected by the micro mirrors.

The referees asked about the requirements for absolute position measurements and what is planned in that direction. It is not yet clear what can be done. The hope is that one can have absolute positions at least for the beams near the end plate.

The referees asked about the 'noise' generated inside the TPC by laser tracks. They suggested not shining the laser on the central electrode. Light reflected inside the TPC onto the central electrode should not create too much trouble but one should check this by measurements.

The referees enquired about the risks from the laser system for the TPC and the environment. Apart from the micro mirrors all optical elements are in a closed gas volume, are accessible, can be adjusted and cleaned. Glues have been tested to be compatible with the TPC operations. Tests show that the laser light inside the TPC does not damage the Mylar strips. The referees suggested to, nevertheless, explore the mechanical behavior of a Mylar strip with a 1 mm diameter hole in it.

## Conclusions

The referees judged the laser system of being well capable to do relative measurements and monitor the TPC behavior. A few tests and measurements on components should be done before assembling the system. The possibility to do absolute measurements should be pursued.