

Review of the ALICE Zero Degree Calorimeters (ZDC) Technical Design Report

Introduction

This note summarizes the process and the conclusions of the review of the ALICE Zero Degree Calorimeters, ZDC, designed to measure the centrality of the heavy ion collisions. The TDR was presented to the LHCC Open Session on March 25, 1999. The ALICE referees Bernardo Adeva, Antonio Ereditato, Gigi Rolandi, and Günter Zech discussed the TDR with the ALICE Collaboration in a meeting preceding the LHCC session in March. The referees were fully satisfied with the detector technology. The Collaboration was asked to elaborate on the impact parameter resolution of the ZDC in general and on its performance for collisions of medium atomic weight nuclei like Ca.

The reply to the questions was presented and discussed in a common meeting of the ALICE Collaboration and the referees prior to the LHCC session on May 27/28, 1999.

Detector Technology

Two neutron and two proton calorimeters measure the energy of the spectator nucleons. Cerenkov light is produced in quartz fibers embedded in very high density materials like tantalum (neutrons) and brass (protons). The technology is suitable for the high radiation dose and is well-tested in previous experiments and full-size prototypes. The intrinsic resolution is much higher than the unavoidable statistical fluctuations of the collision process. The referees have no concern about the technology and the realization of the device.

Comments

The ZDCs have to be integrated into the beam line. LHC and ALICE have agreed on a solution which does not compromise the beam line and allows for an undisturbed propagation of the nucleons from the interaction point to the calorimeters placed at distances of about 120 m from the interaction point.

The impact parameter resolution presented in the TDR ignores fragmentation into heavy fragments. The Collaboration is asked to pursue studies of the influence of the fragmentation on the measurement and to estimate the resolution obtainable at the LHC.

The referees consider that the state of preparedness and scale of the ZDC project are such that an engineering design review, as is planned for the major LHC sub-detectors, is not required in this case.

Milestones

The following list of milestones have been agreed:

- December 2000: final integration of ZDC design with LHC,
- March 2001: end of construction of first neutron calorimeter,
- January 2002: end of construction of second neutron calorimeter,
- June 2003: end of construction of proton calorimeters and electromagnetic calorimeter.