

Test results of the first batch of fibers from Kuraray measured at Jlab and Regina.

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April 22, 2009

Abstract

This document describes the measurements done Regina and Jlab to obtain the light output and attenuation length of the first batch of scintillation fibers from Kuraray type SCSF-78M.

1 Introduction

It was decided to choose SCSF-78M scintillation fibers from Kuraray to build the barrel calorimeter [?] for the GlueX [?] detector. These fibers have an outer diameter of 1 mm with a multi cladding that is 6% of the total diameter of the fiber. The peak emission of this scintillation fibers is at 450 nm with a decay time of 2.8 ns and an attenuation length of >400 cm. The properties of these first fibers are measured at Kuraray, University of Regina and Jefferson Lab using somewhat different methods that are described in this document. The fibers have a length of 410 cm. The light output is specified to be larger than 3.5 photo electrons using a standard photo multiplier tube (PMT) and a Sr90 source positioned at 200 cm from the fiber end. The light attenuation is expected to be larger than 300 cm in the region from 200 cm to 300 cm from the fiber end. Both these values are expected to have a variance of 10% or better.

During production of the first fibers cut to a length 410 cm each every 18th, 19th and 20th fiber has been selected where the first one was tested at Kuraray and the second and third were shipped to Jlab from where the third batch was shipped to Regina. During the initial shipment of the fibers to Jlab the container with the third batch was damaged in the central region of the box. The wooden outer most shell of the box was completely broken in the middle. After unpacking no obvious visual damage to the fibers was found. However to rule out any possible damage a mixture of fibers from the second and third batch has then been sent from Jlab to Regina. As a consequence the first 20 fibers from the third batch the second 20 fibers from the second batch and the last 10 fibers from the third batch were sent to Regina while the corresponding remaining fibers were kept at Jlab for testing.

2 Tests at Regina

3 Tests at Jlab