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A study of fiber in shashlik calorimeter

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A shashlik electromagnetic calorimeter will be produced in Hall A of Jefferson Laboratory for Solenoidal Large Intensity Device (SoLID). WLS fiber and clear fiber will be used as the light guide part of the calorimeter. The blue light from scintillators is converted into green light by WLS fibers and is carried out to the back of the calorimeters for readout. Since the magnetic field reaches about 1.5 T behind the calorimeters, the design is to use clear fibers to further guide the light out of the solenoid for readout by PMTs. Therefore, it is significant to study the perfomance of WLS fiber and clear fiber. This paper describes a comparative test of two different WLS fibers and a light attenuation test for a clear fiber. The results show that the performance of the two WLS fibers is the same under large curvature bending, as well as the attenuation length of the clear fiber is 1.55 dB/m and bending has no effect on clear fiber. Besides, a comparison test for two fiber end-face reflective materials were also described. It reveals that the use of silver ink as a reflective material can increase the light yield by 30%. Thereby, a optimized prototype based on the above experimental results was built and the basic performance were also tested.

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