Liquid scintillator tiles for high radiation environments

Alberto Belloni[a,*], Mahnegar Amouzegar[a], Jeff Calderon[a], Sarah C. Eno[a], Kenichi Hatakeyama[f], Kevin Pedro[e], Geng Yuan Jeng[a], Joshua Samuel[a], Elmer Sharp[d], Young Ho Shin[a], Zishuo Yang[a], Yao Yao[a], Sung Woo Youn[c]

[a] *Dept. Physics, U. Maryland, College Park MD 30742 USA*
[b] *Eljen Technology, 1300 W. Broadway, Sweetwater, Tx 79556 USA*
[c] *Institute for Basic Science, Center for Axion and Precision Physics Research, IBS Center for Axion and Precision Physics Research Room 4315, Department of Physics, Natural Science Building (E6-2), KAIST, 291 Daehak-ro, Yuseong-gu, Daejeon 305-701, South Korea*
[d] *Elmer Sharp Engineering, 7007 Leesville Blvd. Springfield, VA 22151*
[e] *Fermi National Accelerator Laboratory, Batavia, IL, USA*
[f] *Baylor University, Waco, Texas, USA*

Abstract

Future experiments in high energy and nuclear physics may require large, inexpensive calorimetery that can operate to doses of 50 Mrad or more. We present the results of a study of a scintillator tile based on EJ-309 liquid scintillator using cosmic rays, test beam, and ^{60}Co irradiations.

Keywords: organic scintillator, liquid scintillator,, radiation hardness, calorimetry

1. Introduction

Sampling calorimeters using plastic scintillator tiles with wave length shifting fibers, such as the CDF plug calorimeter [**?**], are popular due to their excellent performance at a reasonable cost. Plastic scintillator is available commercially from companies like Kuraray, St. Gobain, and Eljen. When irradiated, however, the performance of plastic scintillator deteriorates; light self-absorption (yellowing) increases and light output decreases. The resulting damage has been studied for most common plastics[1], [2], [3], [4],[5],[6],[7]

*Corresponding author
Email address: abelloni@umd.edu (Alberto Belloni)

2. Tile design

3. Test beam results

4. Light yield dependence on tile parameters and comparison with simulation

5. Radiation hardness tests

6. Conclusions

7. Acknowledgements

The authors would like to thank Randy Ruchti of Notre Dame for providing the capillaries and Yasar Onel's group at the University of Iowa for help with the test beam. This work was supported in part by U.S. Department of Energy Grant YYYYY.

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