BROOKHAVEN NATIONAL LABORATORY

BY D. Balzarini DATE 9-60SUBJECT "Cerenkov and ScintillationSHEET No. 1 OF 5

CHKD. BY _____ DATE _____

Properties of Plexiglas UVT and UVA"

JOB No. DAB-2DEPT. OR PROJECT CosmotronSummaryBNL 6865

APR 5 1961

A test was made to compare the scintillation and Cerenkov properties of two types of Plexiglas, UVA (ultra violet absorbing) and UVT (ultra violet transmitting). Pulses due to cosmic rays traversing the materials were analyzed with a twenty channel pulse height analyzer. Analysis of the data indicates the following ratios of light output:

Facsimile Price \$ 1.10Microfilm Price \$ .80

Available from the
Office of Technical Services
Department of Commerce
Washington 25, D. C.

$$\frac{\text{UVT Cerenkov}}{\text{UVA Cerenkov}} = 1.03$$

$$\frac{\text{UVT scintillation}}{\text{UVA scintillation}} \leq .16$$

$$\frac{\text{UVA scintillation}}{\text{UVA Cerenkov}} \leq .05$$

MASTER

Thus the UVT sample has less than 1/6 the scintillation effect of UVA and is to be preferred for counters.

Experimental Procedure

Figure I shows a block diagram of the experimental equipment. Coincident pulses from cosmic rays passing through counters I and II were used to open a gate in the Pulse Height Analyzer during which time a pulse from counter III may be analyzed. The counting rate was 3 per minute.

Figure IIa is a geometrical diagram of counter III. The dimensions of the rectangular portion were $2\frac{1}{2} \times 2\frac{1}{2} \times 4$ inches. The triangular portion of the counter was painted dull black with Krylon plastic paint. The reason for the triangular shape is that light rays traveling in the "z" direction must make at least two reflections before reversing into the phototube. Thus, the absorbing effect of the blackened end is raised to the second power.

Figures IIb and IIc show the geometrical positions of counter III for the two cases. Since Cerenkov light is confined to one direction (a cone centered about the particle direction), it will be seen by the phototube when the counter is in position IIb. Scintillation light is also seen by the phototube in

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

BROOKHAVEN NATIONAL LABORATORY

BY D. Balzarini DATE 9-60SUBJECT "Cerenkov and ScintillationSHEET No. 2 OF 5

CHKD. BY _____ DATE _____

Properties of Plexiglas UVT and UVA"

JOB No. DAB-2DEPT. OR PROJECT Cosmotron

position IIb, but is negligible in comparison to the Cerenkov light.

When the counter is in position IIc, the phototube sees the scintillation light plus the reflected Cerenkov light. The amount of reflected Cerenkov light is small but is of the same order of magnitude as the scintillation light. We are thus prevented from determining a definite value for the scintillation light.

An experimental run was made with each of the materials in each of the two positions. The data are plotted in Figures III and IV. Runs were also made to determine the accidental background rate. This rate is subtracted from the data.

The center of each histogram is found by using the formula $\bar{x} = \frac{\sum x_i N_i}{\sum N_i}$
Following are listed the relative values thus obtained.

UVT scintillation plus reflected Cerenkov	< .10
UVA scintillation plus reflected Cerenkov	~ .65
UVT Cerenkov	13.8
UVA Cerenkov	13.4

BROOKHAVEN NATIONAL LABORATORY

BY D. Balzarini DATE 9-60SUBJECT "Cerenkov and Scintillation
Properties of Plexiglas UVT and UVA"SHEET No. 3 OF 5

CHKD. BY _____ DATE _____

DEPT. OR PROJECT CosmotronJOB No. DAB-2

Figure I

 $\Omega = \text{Solid angle subtended by 6" counters} = .03 \text{ radian}$

BROOKHAVEN NATIONAL LABORATORY

BY D. Balzarini DATE 9-60

SUBJECT "Cerenkov and Scintillation

SHEET No. 4 OF 5

CHKD. BY DATE

Properties of Plexiglas UVT and UVA"

JOB No. DAB-2

DEPT. OR PROJECT Cosmotron

Figure IIa

Fig. II b

Fig. II c

← Counter III →

BROOKHAVEN NATIONAL LABORATORY

BY D. Balzarini DATE 9-60

SUBJECT "Cerenkov and Scintillation
Properties of Plexiglas UVT and UVA"

SHEET No. 5 OF 5

CHKD. BY: DATE:

DEPT. OR PROJECT Cosmotron

JOB No.:

Figure III UVA Scin. & refl. Cerenkov; UVA & UVT Cerenkov

Figure IV Scintillation and reflected Cerenkov