sputtered on a nitrocellulose film depends on the wavelength. Curve 2 has been obtained from curve 1 with allowance for this dependence. The difference between curves 2 and 3 in the region $\lambda > 1\ \mu$ may be the result of unaccounted-for absorption in the optical system.

We note in conclusion that the use of a radiotechnical method of meauring film oscillations may greatly expand the capabilities of the proposed method.

The author is grateful to E. Saval'skaya for preparation of the films and to E. F. Kushchenko for technical assistance.

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SHOWER SPECTROMETERS WITH RADIATORS OF THALLIUM HALIDE SALTS

A. A. Varfolomeev, V. I. Glebov, E. I. Denisov, and Yu. B. Korolevich
I. V. Kurchatov Atomic Energy Institute
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The radiators customarily employed in total-absorption Cerenkov spectrometers are made of lead glass, necessitating constructions of relatively large dimensions and weights. There are known attempts to use radiators of other materials [1] for the purpose of reducing the radiator dimensions or to improve their spectral characteristics. We have used in this study one of the densest transparent materials, namely single-crystal KRS-6, which is a mixture of TlCl and TlBr salts (see [2]). This has made it possible to construct spectrometers having the smallest known dimensions, without loss of energy resolution at 100% gamma-quantum and electron registration efficiency.

The spectrometer radiators have the form of a truncated cone with angle ~20% between the axis and the generator (Fig. 1). The radiator height is 14 cm, its volume 0.9 l, and weight 6.5 kg. The critical energy of the radiator material is 9.2 meV, and the radiation unit is 1.02 cm. the radiator material is transparent to light in the 4200 - 20000 Å range.

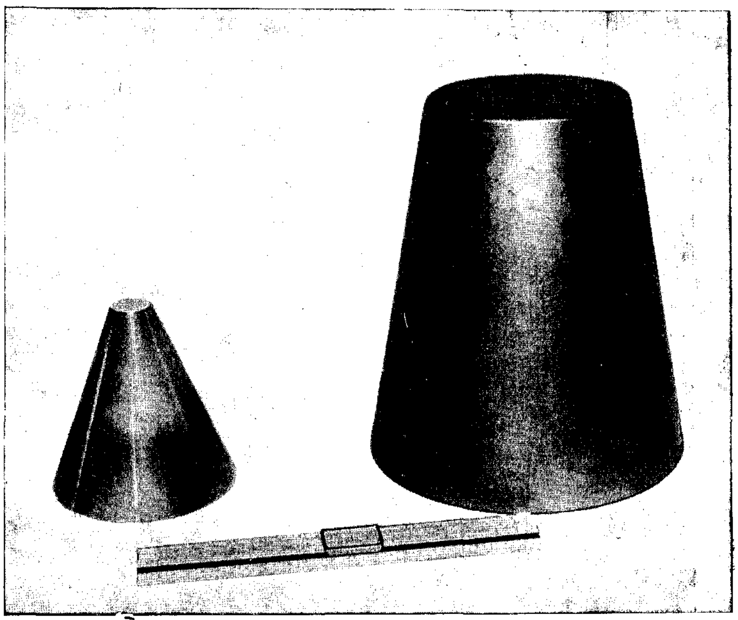

Fig. 1. Radiators 14 rad. un. thick made of KRS-6 and of lead glass.

The total intensity of the Cerenkov light of charged shower particles (at the same primary-particle energy) in KRS-6 is only 20% lower than in lead glass. The better light-gathering conditions in a compact crystal radiator make it possible to obtain a high energy resolution.

The small dimensions of the crystal radiator lead to a decrease of the light signal compared with

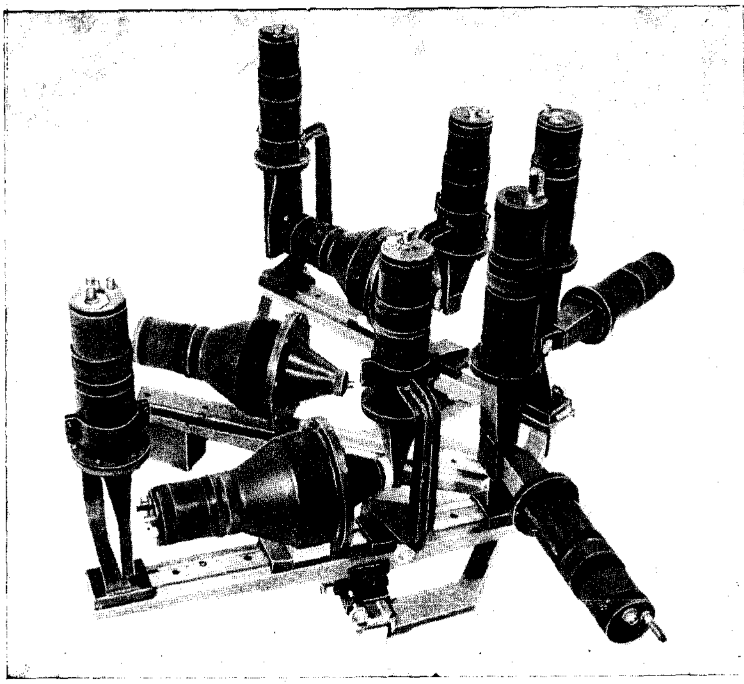

Fig. 2

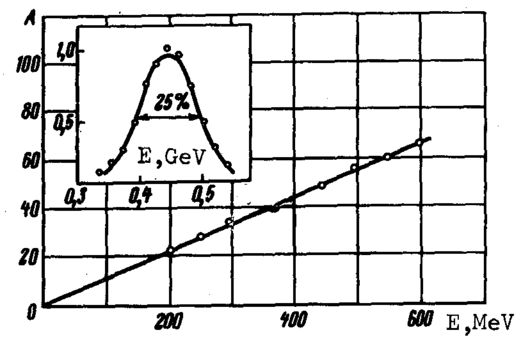

Fig. 3

Fig.2. Overall view of the installation

Fig. 3. Calibration curve and spectrometer line shape.

ordinary radiators. In particular, the spectrometer pulse duration is determined in this design completely by the characteristic of the photomultiplier, and amounts to about 60 nsec.

Fast electronic circuits using transistors and tunnel diodes have made it possible to obtain a spectrometer resolution time of 60 nsec with a linear dynamic range of about 30. The particle selection system, which included scintillation counters and coincidence circuits, had a resolution time of 10 nsec. FEU-36 photomultipliers were used in the scintillation counters, and FEU-49 multipliers in the spectrometers. The selection system and the spectrometers with the spatial adjustment devices are shown in Fig. 2.

The spectrometers were calibrated with electrons with electrons of energy 200 - 600 MeV. The calibration characteristic is linear in this region. The line shape is almost Gaussian, and the resolution is $2.354\sigma/E = 25\%$, where σ^2 is the variance of the distribution. The spectrometer calibration is illustrated in Fig. 3. The dimensions of the constructed radiators make it possible to use the spectrometer to measure electrons and gamma quanta with energies up to 10 GeV (with linearity of the characteristic maintained).

The absence of a known technology for growing large crystals has made it necessary to perform preliminary work to develop a method of single-crystal growing. The authors thank T. I. Darvoid, I. S. Lisitskii, and M. A. Popov for work done in 1965 - 1967 on the growing of 8 crystals for the described spectrometers.

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