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Suppression of a slow component of the BaF2 crystal luminescence with a thin multilayer filter

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Fast component of the BaF2 crystal luminescence with emission peak at 220 nm allows to employ those crystals to construct fast calorimeters to operate at high radiation rate. However, a slow component with emission peak at 330 nm and about 85% of total emission light could create big problems when working at high radiation environment.

In this work we report results of tests of multilayer filters that can suppress luminescence in the range about from 250 nm to 400 nm what covers most of the BaF2 slow component luminescence. The filters are made by spraying layers of rare earth oxides on the quartz glass substrate. Typically filters comprise 200-220 layers. A few samples of filters were prepared by spraying of thin layers on quartz glass. The filters have a peak transmittance of about 70-80% in the range 200-250 nm. Measurements of light output of the BaF2 crystal with and with no filter between the crystal readout end and PMT demonstrate essential suppression of the slow component. Thin filter applied directly on the crystal readout end demonstrated suppression of the slow component as well.

Secondary topics

Applications

Experience with current calorimeter at the intensity frontier

Primary topic

Crystals

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