

External Collimator

eMLC-1

External Collimator for Amptek SDD and Fast SDD® Detectors

Amptek's eMLC-1 External Collimator is an accessory which can be used to reduce the flux of X-rays entering Amptek's SDD and Fast SDD® detectors from wide angles, improving background and reducing spectral interferences. The optimum external collimator depends strongly on the geometry of a particular instrument; many customers will design their own collimator for their application. This is a general purpose tool which helps in many applications and is a basis for customization.

Amptek's SDD and Fast SDD® detectors include an internal multilayer collimator (MLC), which prevents X-rays from reaching the edge of the detector's active volume, where charge collection is poor. The eMLC-1 utilizes the same multilayer collimator, mounted externally, in a brass housing. The multilayer collimator stops X-rays efficiently, with a core of tungsten, and layers of progressively lower-Z materials to stop its characteristic X-rays; the outer layer is aluminum.

Specifications

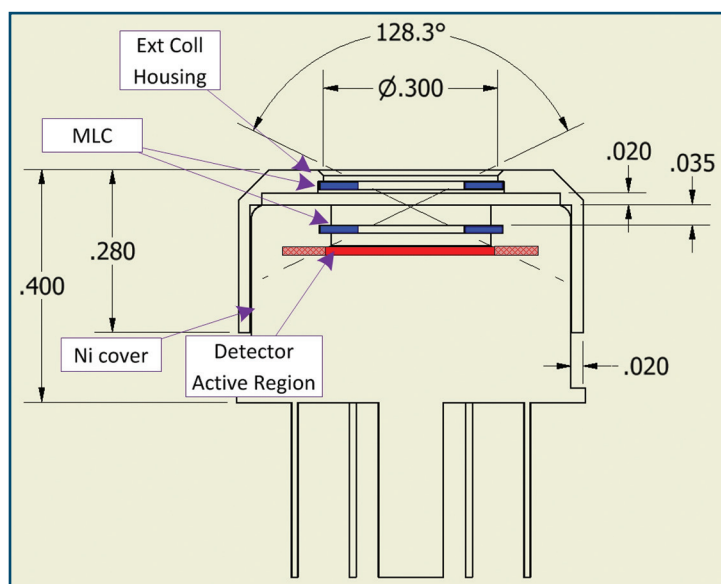
Multilayer Collimator (MLC): The base metal is 100 μm of tungsten (W), the first layer is 35 μm of chromium (Cr), the second layer is 15 μm of titanium (Ti), and the last layer is 75 μm of aluminum (Al).

Collimator housing: The base metal is 0.020" brass, with a nickel finish. Note that this is on top of the 0.010" nickel cover of the detector.

Open area: 17 mm²

Geometry

The drawing below (right) sketches the mechanical design. Note that the housing is kept 0.020" from the Be window by the small step at the outer edge.



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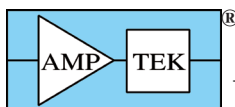
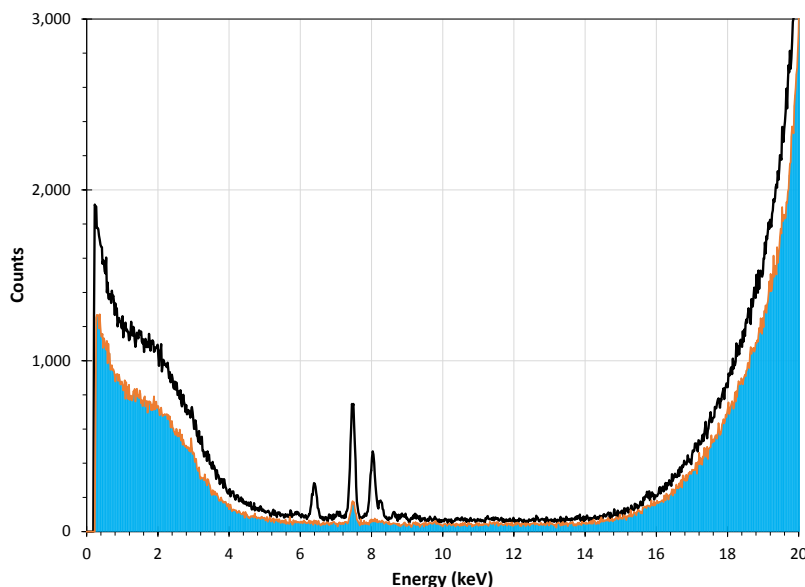
AMETEK®
MATERIALS ANALYSIS DIVISION

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Application

The spectra below illustrate the use of the external collimator. These were obtained from a sample of high density polyethylene, which should not have metals present, measured using Amptek's Experimenter's Kit with an Ag-anode X-ray tube equipped with W and Al tube filters. The black trace was taken without an external collimator on the detector. Visible peaks include Fe, Ni, and Cu (there is Ni from the edge of the detector cover, with the other materials in the fixture). The orange trace was taken with the eMLC-1. The Ni intensity is reduced by a factor of 7 while the other lines are removed entirely. The total count rate is 20% lower due to the reduced solid angle.



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