Simulation of a Proposed Start Counter slat.
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The following simulation was done using a home grown code called BARTIM.
This code propagates the light using the Fresnel Equations to calculate the scattering at the surface. The time is tracked to view time spread effects. In addition the time spread due to the scintillator is included, as well as attenuation effects. The scintillator can also be wrapped in a reflective material e.g. Aluminized mylar. The reflectivity of the wrapping was taken to be 0.8, (or 0.0 for "black paper). The tube diameter was taken to be larger than 2.9 cm.
The index of refraction is n = 1.58 for the scintillator and n = 1.5 for the tube glass.
The photons are generated isotropically at the z indicated. For each event about 10,000 photons per MeV of energy loss is generated. (The exact number varies with scintillator and is given in the table below).

Poperty	BC408	BC404
#Photons	2830	3000
Attentuation	380 cm	160 cm
Rise time	0.9 ns	0.7 ns
Fall time	2.1 ns	1.8 ns

The number of photons corresponds roughly to a minimum ionizing particle incident perpendicular to the surface of the 1.5 mm scintillator. 100 events were thrown.
The geometry of the scintillator is shown in the figure. For this simulation a flat scintillator was used, coupled directly to the phototube. (No bends or light guide).
Three conditions were simulated

1. BC404 black wrapping.
2. BC404 aluminized mylar wrapping
3. BC408 aluminized mylar wrapping.

In each figure the upper two plots show the effect of the time smearing due to transit time only. The figures on the bottom include the effect of the scintillator time constants. The figure on the left is for the beam incident 1.0 cm from the tube and the figure on the right is for the beam incident at 50 cm from the tube.
The average number of photons per event at the photocathode for each case is given by

Black BC404	1 cm	447 photons	50 cm	357 photons
Alum BC404	1 cm	1193 photons	50 cm	727 photons
Alum BC 408	1 cm	1260 photons	50 cm	943 photons

BC408 is clearly superior due to its longer attenuation length. From the plots it is clear that the faster BC404 does not give a significant improvement.
Future work will include the effect of bending and a the addition of a light guide.