

Photon Coverage

Alex R. Dzierba

As we prepare for the calorimeter review, this is a reminder about the photon coverage, especially in the BCAL to FCAL transition region. Please see the detector drawing below. Note the lines at angles of 10.8° , 14.7° , 118.1° and 126.4° . These are defined by the length of BCAL, the inner and outer radius and placement with respect to the target center.

As one of the signature reactions several of us have studied $\gamma p \rightarrow \eta\pi^0 p \rightarrow 4\gamma p$ at $E_\gamma = 9$ GeV. For events with uniform $\eta\pi^0$ masses between 1.0 and 2.0 GeV/ c^2 , uniform in decay angles, with a $e^{-5|t|}$ distribution, here is how photons populate the calorimeters:

Element	Percent of all photons
Hole in FCAL	0.97%
FCAL	53.15%
BCAL	45.68%
Upstream of BCAL	0.20%

There are four photons per event. The definition of BCAL angular coverage in the table is from 10.8° to 126.4° . As we know, and as is being addressed, photons trajectories exiting the end of BCAL are challenging.

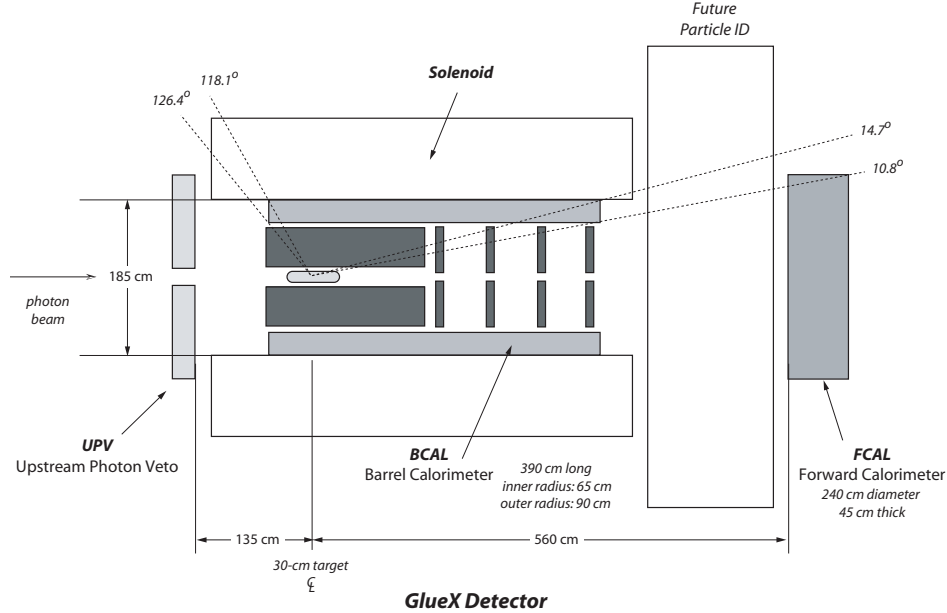


Figure 1: Note the lines at angles of 10.8° , 14.7° , 118.1° and 126.4° . These are defined by the length of BCAL, the inner and outer radius and placement with respect to the target center.

For the $\approx 46\%$ of photons from the $\gamma p \rightarrow \eta\pi^0 p$ reaction that strike BCAL, the distribution along BCAL is shown in Figure 2. The unshaded histogram corresponds to photon angles from 10.8° to 126.4° and the shaded histogram corresponds to photon angles from 14.7° to 118.1° . About 67% of the photons hitting BCAL are in the shaded region.

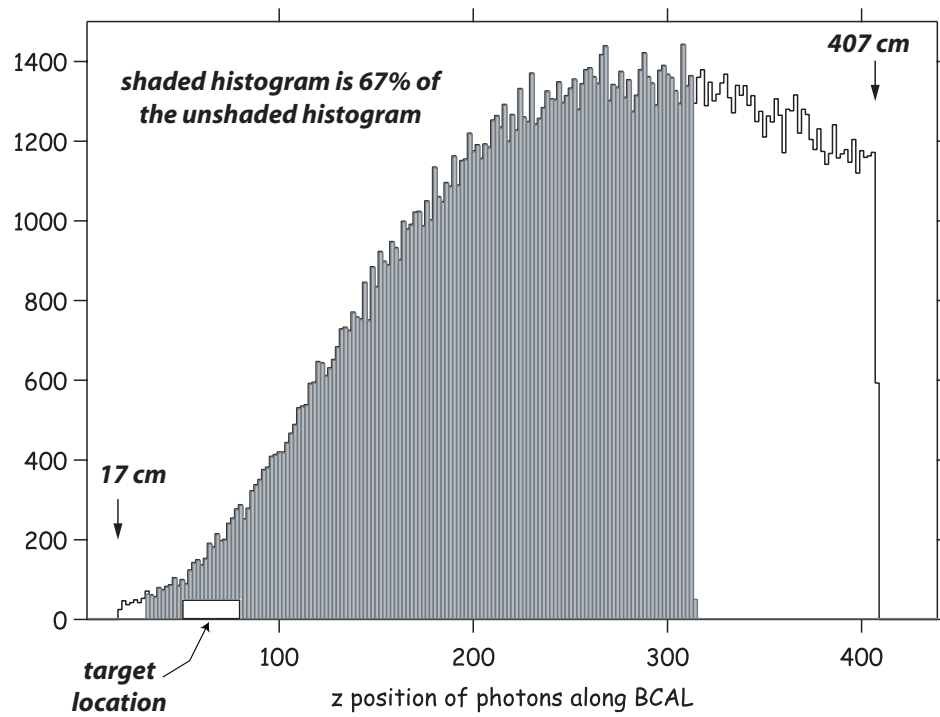


Figure 2: Position of photon hits along BCAL for the $\gamma p \rightarrow \eta\pi^0 p$ reaction. See the text for how the unshaded and shaded histograms are defined. The position of the target is also shown.