

# BCAL Beam Test Analysis

April 2007

The objective of this document is to outline the goals and priorities of the BCAL Beam Test Analysis from the Hall-B data, towards the report expected by JLab/DOE at the end of April. This report must contain results on the energy and timing resolution of the BCAL at our below milestone/Design Report values.

Currently, while issues with the tagger and reference timing are being investigated, timing for the BCAL is done with an internal reference. What this means is that the mean timer of cell 7, for example, is subtracted from cell 9 and 9 TDC values in order to cancel out common timing offsets. Once the tagger TDCs are aligned for non-veto events, a tagger-based reference timing will be subtracted from the BCAL TDCs instead.

Walk correction is being carried out now on 2D plots of BCAL ADC<sub>i</sub> versus a timing difference, since we are unable to use the individual TDC<sub>i</sub> values.

Since time is short, the following list of runs is proposed, provided time permits and assistance from JLab on the tagger timing offsets is received. For the above deadline, the timing difference and TOF resolution will be extracted at minimum for readout cells 7 and 8 only, which carry the bulk of the deposited energy. Walk corrections are being refined for these two cells as well as cell 9 at present.

The rows highlighted yellow indicate diagnostic/check runs that have largely been carried out. See references in the E-log (entries 195 and 199).

Description	Run No	Z (cm)	$\theta$ (deg)	Details
Veto	2436	0	90	Veto trigger (tagger timing)
Pedestals	2352	0	90	
	2376	-50	30	See Elog 149
	2377	-50	30	See Elog 149
	2456	+25	0	With beam
	2457	+25	0	Without beam
Normal	2334	0	90	Golden run
Angle runs	2389	-100	30	Steep angle near end
	2392	-100	15	Steep angle near end
Position runs	2335	-100	90	Combine with 2334
	2336	-50	90	Combine with 2334
	2353	+50	90	Combine with 2334
	2354	+100	90	Combine with 2334

- Aggressive Scenario: If JLab personnel (David, Simon, Elton) resolve the reference timing issue quickly, this will allow the investigations on z-position and theta runs in the above table (and maybe a few more runs).
- Conservative Scenario: Emphasis will be placed only on a few Angle runs.
- Fallback Scenario: The energy resolution as reported by Blake at the Collaboration Meeting and with Alex's selected studies (versus angle) will stand as is. Timing resolution will then be refined for the timing difference for cells 7 and 8 only and only for Run 2334. Already from the preliminary numbers and those extracted from the TRIUMF and cosmics tests, we are below the milestone value of 300ps for the timing resolution.

The scenario to be followed will become clear by April 17, following Blake's presentation at the weekly software meeting.

In the long run, a complete analysis of the Beam Test data will take place, including all z and theta scans as well as specific studies (trigger, threshold, beam current, beam height, cosmics). The converter-run study has been completed by the Athens group.