

Comparison of S-curves by a simple threshold scan with L1A triggers and the Noise Occupancy scan in the SCTDAQ(V3.38)

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21 April 2003

At KEK, most of the s-curve data have been evaluated with a simple threshold scan with L1A triggers and no CAL trigger (we call it as "Noise scan"). There were a few reasons: we could not run the default "Noise Occupancy Scan" in the older versions of the SCT DAQ; and occasionally we needed to run the module QA at the DAQ benches without CLOAC because of limited number of benches. In recent days, we run the module QA only in the bench with the standard DAQ trio of CLOAC, MuSTARD, and SLOG, and we run the default "Noise Occupancy Scan" with the SCTDAQ version 3.38.

Regarding with the latest S-curve issue, we have identified a module that are lately assembled and has a severe instability, i.e., discontinuities at below and above the 0 fC threshold, i.e., discontinuities at negative and positive thresholds. The 0 fC threshold is where the efficiency is 50% in the s-curves. The module id is 20220170200380. The data were taken at cold, after the long-term test.

The S-curve plots, of the link 1, is shown in the first figure:

380stscrun5220_66_1_150mV.pdf

The full scale of the horizontal axis is 150 mV, to be the same as the NO plots. The Noise scan data have been taken with a step of 2.5 mV that is the same step size as the NO plots up to 200 mV. In comparison, a plots of the NO scan is shown in the second figure:

20220170200380mLTL_NO_1.pdf

The impression of two plots is different: Although two discontinuities are visible in the two plots,

- 1) S-curves are more aligned in channels in the Noise scan than in the NO scan
- 2) The discontinuity at negative threshold seems more pronounced in the NO scan than in the Noise scan
- 3) In detail, the S-curves are shifted toward lower thresholds in the NO scan than in the Noise scan

We wonder where the difference has come from. If there is no bug in both scans, the difference may have come from rate dependence. The Noise scan is "event-by-event" triggering while the NO scan is the "burst" triggering, as we understand. The "burst" triggering is much faster than the even-by-event triggering.

Figures attached: 380stscrun5220_66_1_150mV.pdf, 20220170200380mLTL_NO_1.pdf

ATLAS SCT Module Test - Fri Apr 18 11:40:27 2003 - KEK - Module 20220170200380mDaqTL
Run 5220 Scan 66 Module 0 Link 1 - THRESHOLD (mV) from 0.00mV to 150.00mV in 2.50mV steps, total 61 points



