

Onboard filter

Ideal Flight Mode (use average values of most calibration parameters) :

MeV/DAC is 0.36 (large diode) and 25 (small diode)

	LEX8	LEX1	HEX8	HEX1
ADC/DAC	11.2	1.3	11.5	1.3
MeV/ADC	0.032	0.277	2.17	19.2
Pedestal	510	210	510	210

The OBF code calculates the energy in the Calorimeter from the digis using hard-coded constants. These are the 4 pedestals, and 4 max_values. The gain for each range is calculated as max_value/4096. So the max_values should be set at MeV/ADC*4096

max_value	132	1134	8904	78769
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This is slightly different to what is in the code right now, but I can't easily change it without making a branch tag, as the new OBF code is now at the head.

OnboardFilter

		v4r5	v5r0p2	v6r2p8	v6r4	v6r5	v6r8	v7r0p2	v7r0p2mod
DFC_M_STATUS_TKR_SKIRT	16	393	0	0	315	315	371	408	409
DFC_M_STATUS_TKR_EQ_0	17	2118	2143	2142	2789	2789	2767	2330	2295
DFC_M_STATUS_ZBOTTOM	21	1941	2001	2001	2688	2688	2659	2475	2456
DFC_M_STATUS_E350_FILTER_TILE	27	266	525	512	301	301	272	248	261
DFC_M_STATUS_E0_TILE	28	1971	1398	1408	1535	1535	1608	1944	1974

16 – A tracker track may have passed through the gap between the CAL and the ACD

17 – There is no evidence of at least one track and $E(\text{raw}) > 250$ MeV

21 – Veto if the CAL has $E > 100$ MeV but there is no evidence of a track into the CAL

27 – Event has less than 350 MeV in the CAL, and ACD filter tiles are hit.

28 – Event has no energy in the CAL, but has an ACD tile hit.

There is clearly still a mismatch between the new calibration constants introduced with the upgraded CalDigi and the hard-wired CAL constants used by the onboard filter. The change in #28 is probably due to the increased zero suppression threshold.

v4r5: 2 MeV LAC threshold

v5r0p2: old tkrecon, old caldigi, 1 MeV LAC threshold; v6r2p8: new tkrecon, oldcaldigi

v6r4 : new caldigi (muon gain, low cal noise, 1 MeV LAC threshold)

v6r5 : (flight gain, low cal noise, 1 MeV LAC threshold)

v6r8 : (bugfix to ULD settings)

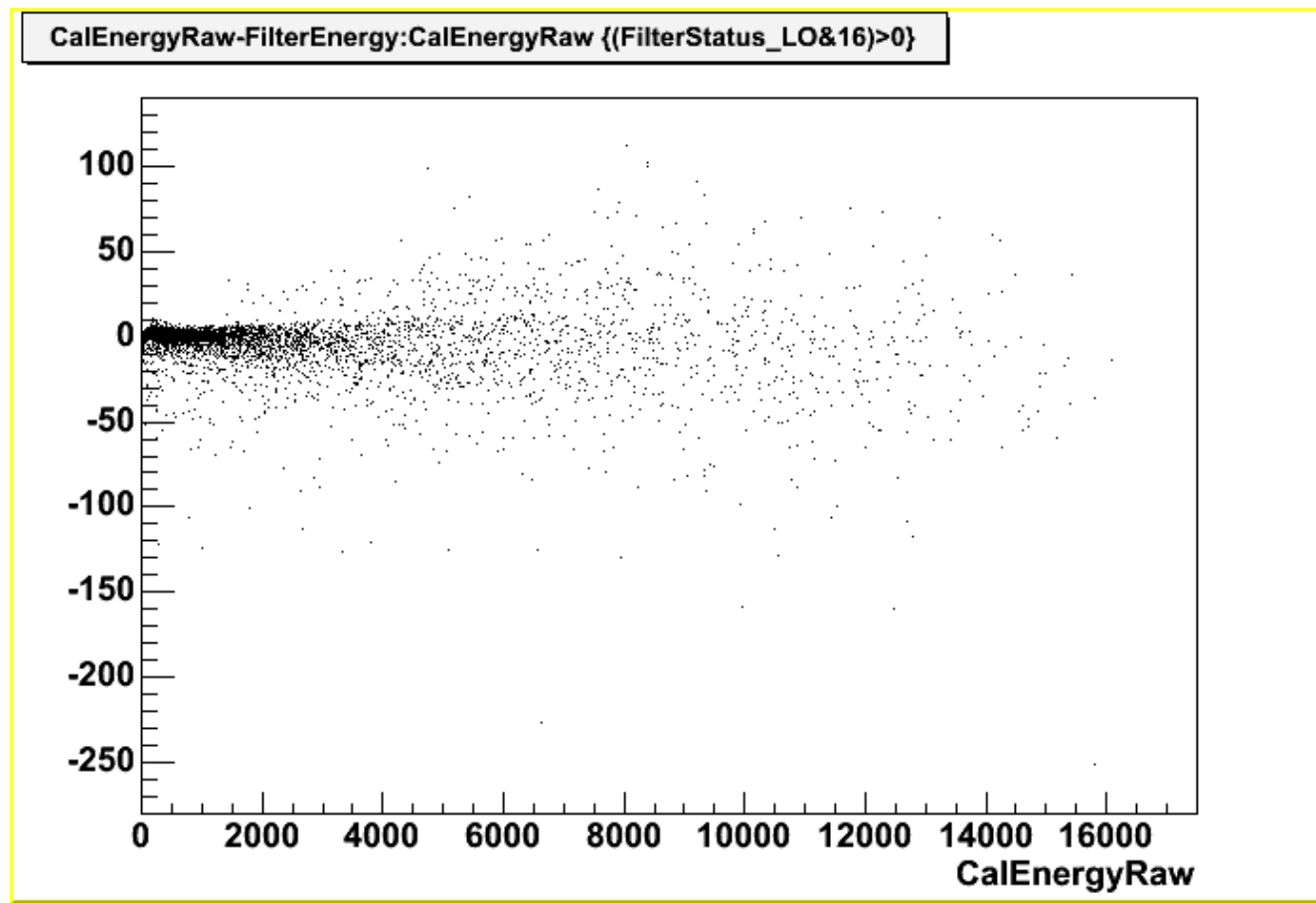
v7r0p2 : altered cal constants in OF, flight-like cal noise, 2 MeV LAC threshold

v7r0p2mod: slightly changed max_values in OF.

CalEnergy vs filter energy

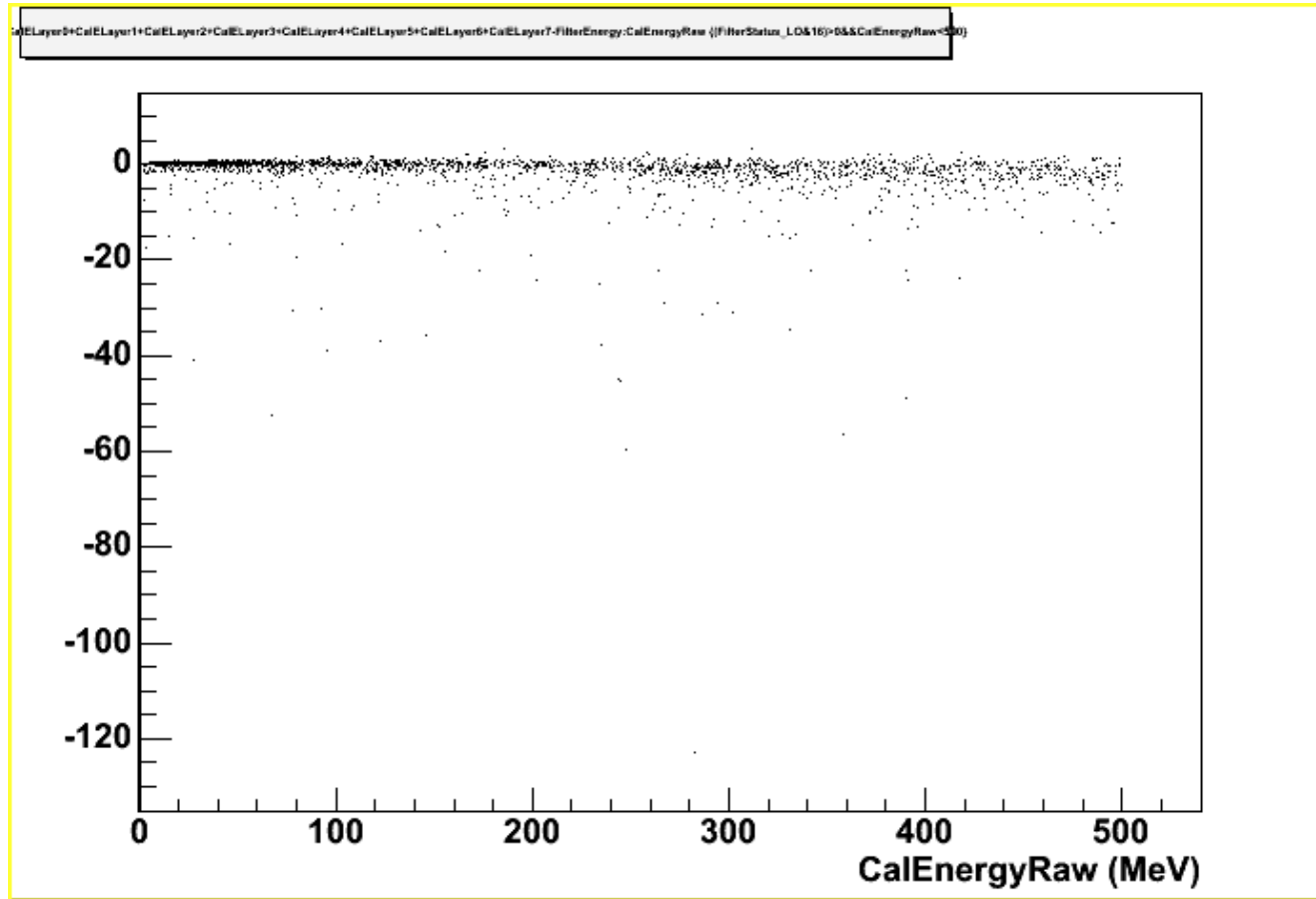
Where do the outliers come from? The rounding error (in filter determined energy) should be $\sim 0.25 \cdot \sqrt{n}$, and be $0.25 \cdot n$ max. Could this be related to the $0.5 \cdot \text{LAC}$ threshold cut?

AllGamma



v7r0p2mod

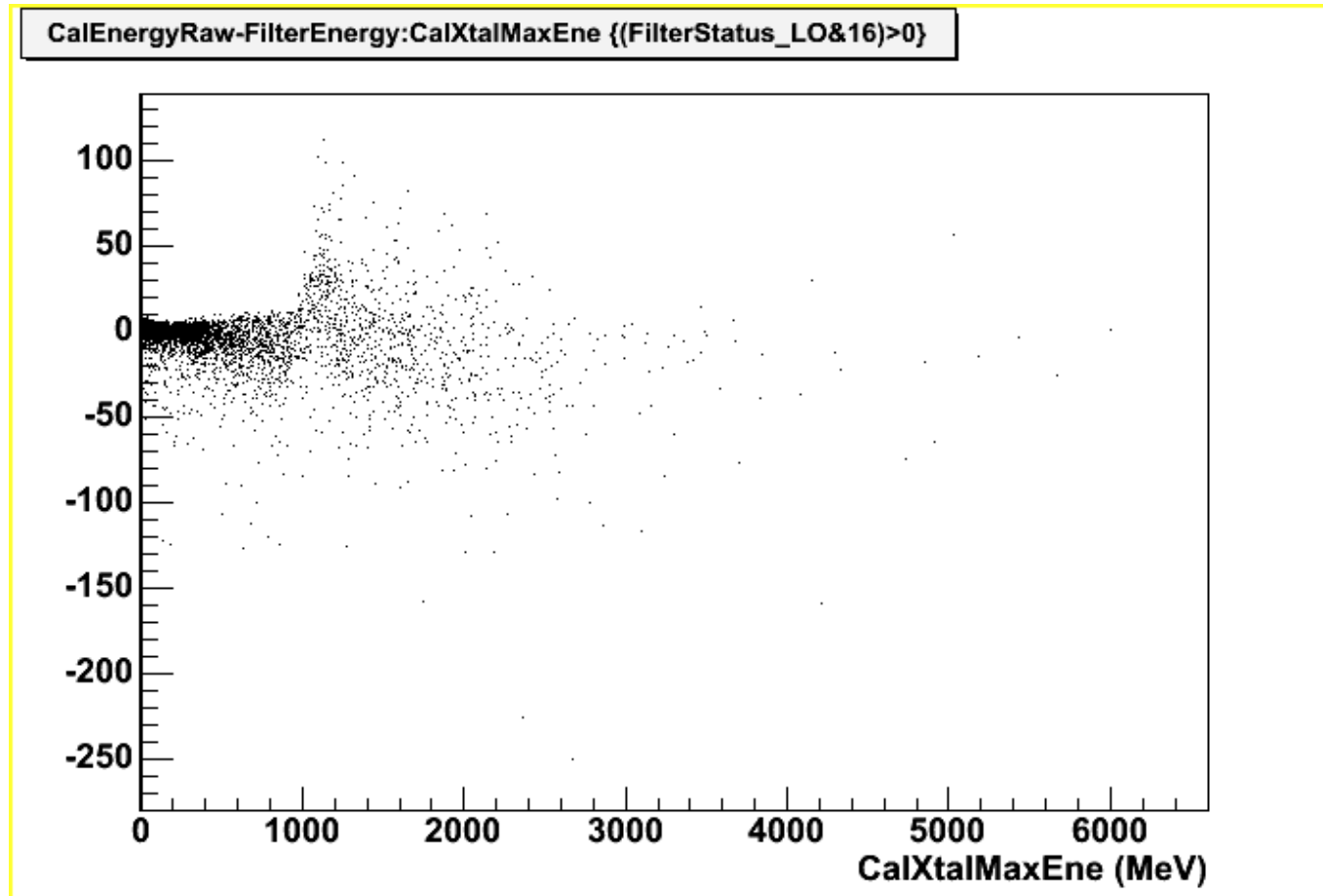
AllGamma



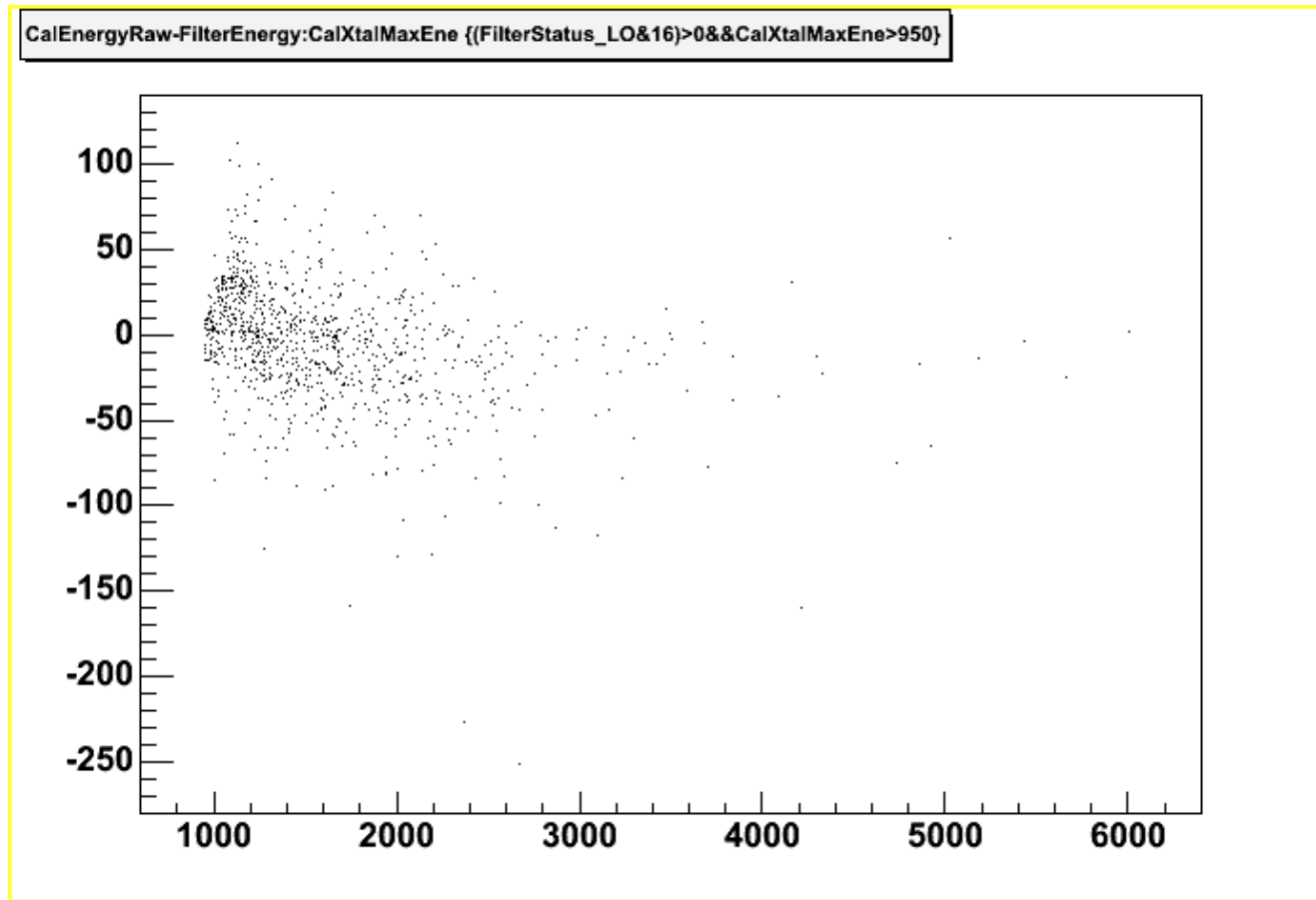
Zooming in... uncorrected Cal Energy vs filter energy.

v7r0p2mod

Something odd happening at ~1 GeV? The distribution is still centered on zero, but there are many more underestimated energies (in OF).

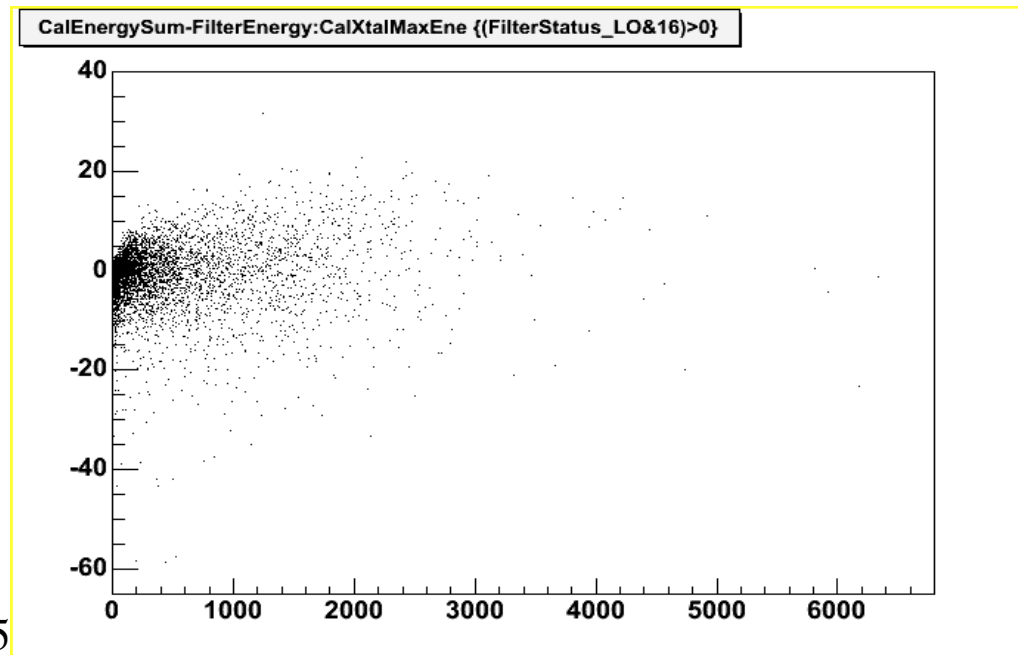
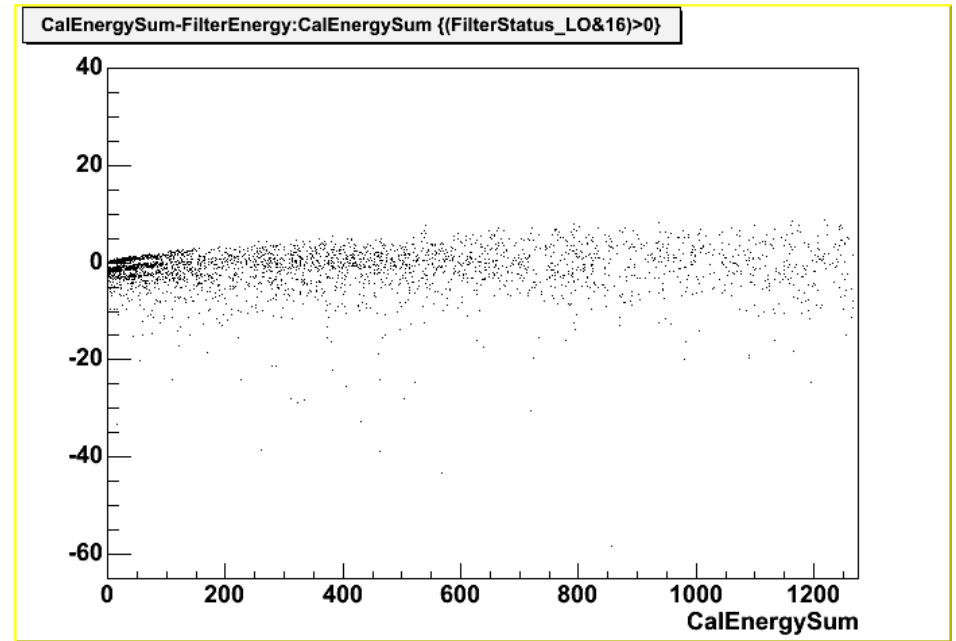
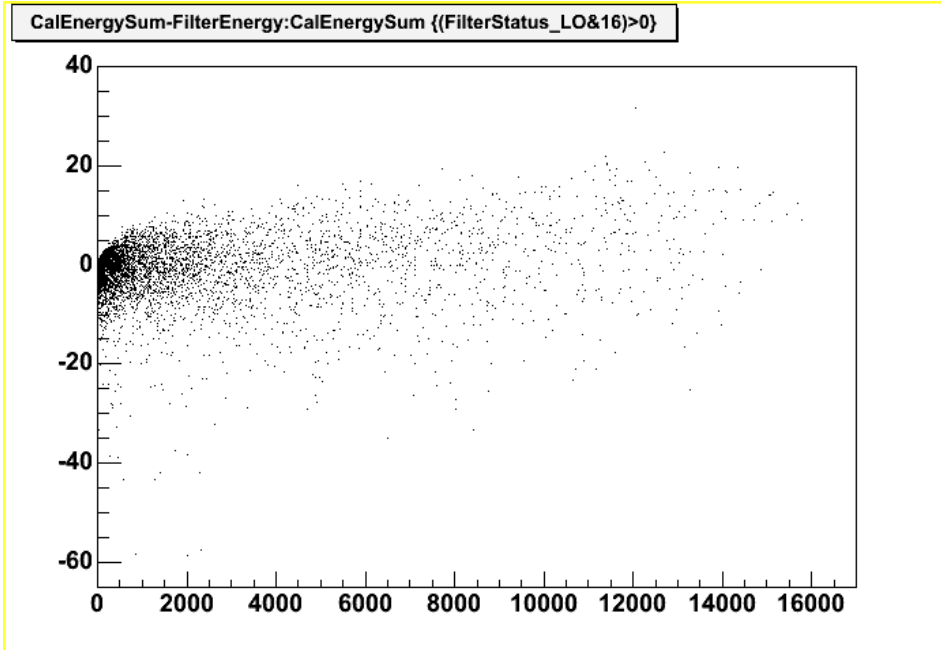


v7r0p2mod

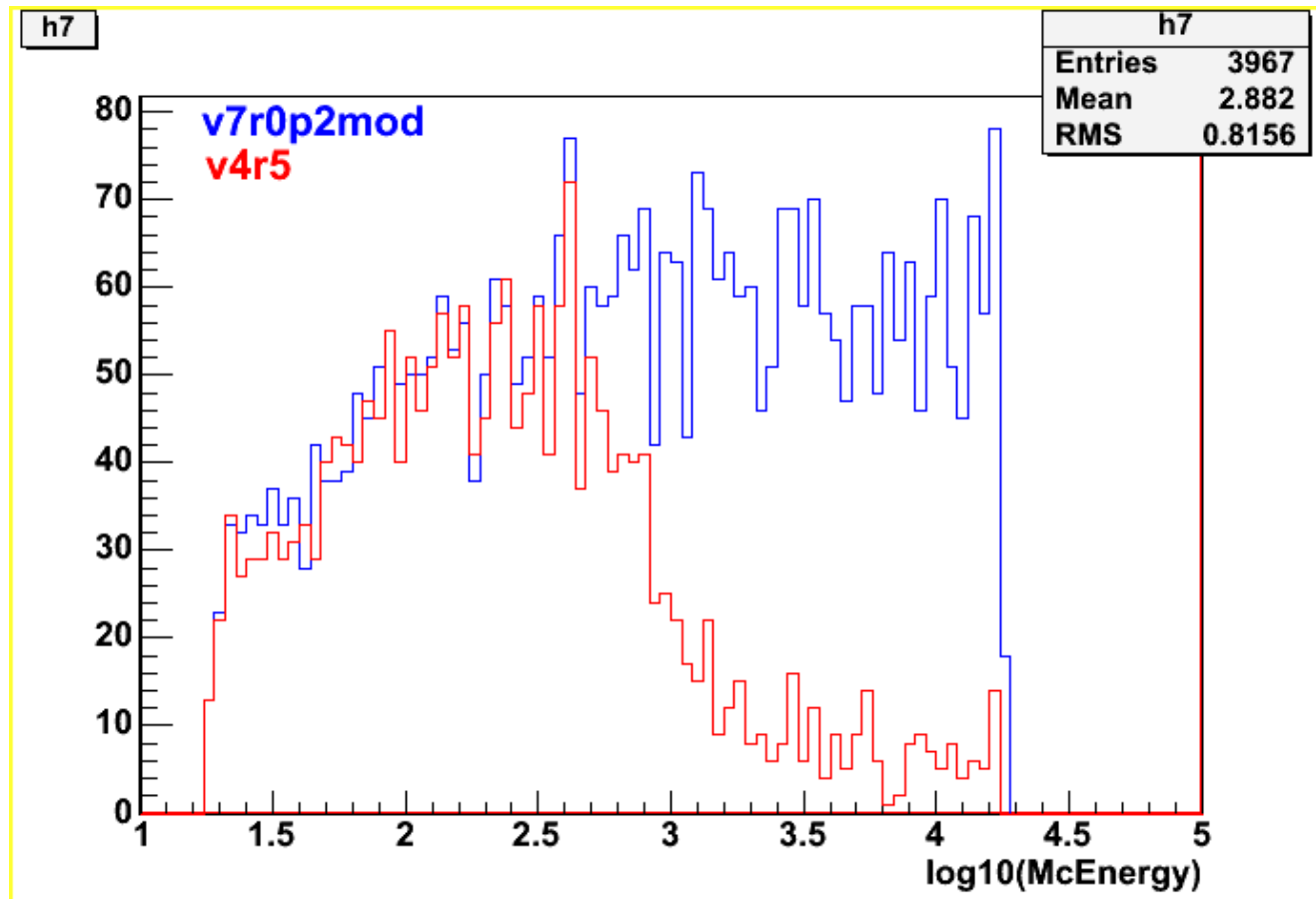


The distribution of CalEnergyRaw-FilterEnergy is still centered on zero. This distribution includes at least one xtal readout in the 3 cal readout range.

v4r5 (for comparison)



Effect of OnboardFilter v7r0p2/v4r5



v7r0p2 cuts: `FilterStatus_HI==0&&(GltWord&14)>0`

v4r5 cuts : `FilterStatus_HI==0&&GltWord>3`

Summary

The filter is working pretty much as it did before the CalDigi changes. The exceptions are vetos 17 and 21, which are now set a little more often (have we changed anything in TkrDigi that may cause this?).

The filter is usable as is. What do we want to do for the 1B run?

- Use the existing filter.
- Update the Cal constants to the correct values.
- Use the new code recently checked in by Richard.