

SuperB test-beam data analysis

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SuperB meeting, Pisa, 14 October 2011

People involved in the analysis

- ◆ result of ~ 5 working days in this week
- ◆ collaboration of Benjamin Oberhof and Antonio Paladino in Pisa
- ◆ thanks to Carla Sbarra for a lot of useful work and information on run configuration & eLog data!
- ◆ are starting or will soon start working on data analysis
 - ▶ Laura Fabbri in Bologna (striplets?)
 - ▶ Lorenzo Vitale, Carlo Stella in Trieste (striplets)
 - ▶ Eugenio Paoloni in Pisa (analog MAPS)
 - ▶ Marcin Chrzaszcz in Kracow

First analyzed runs

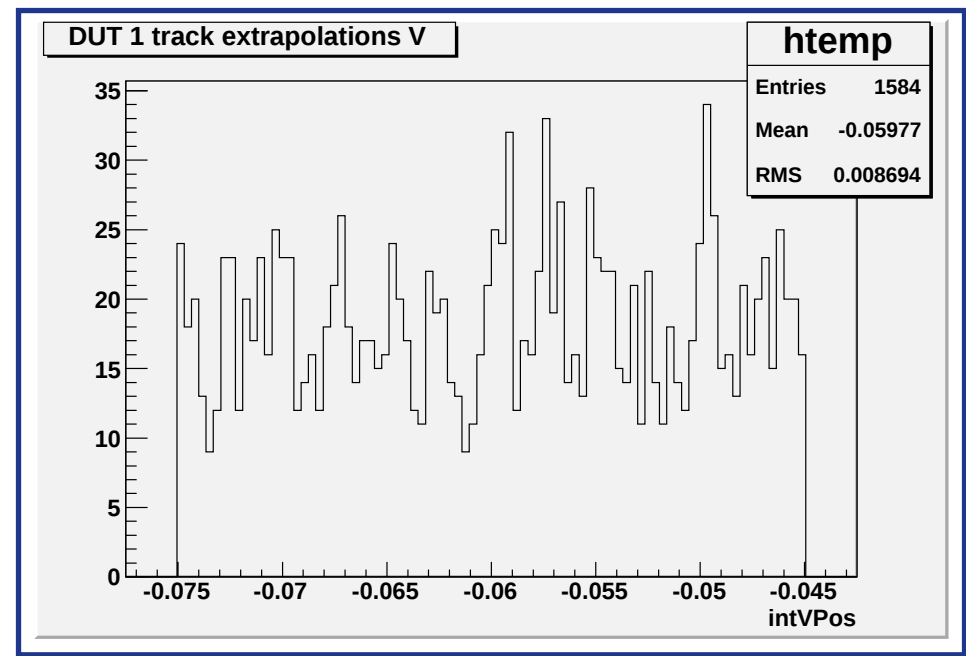
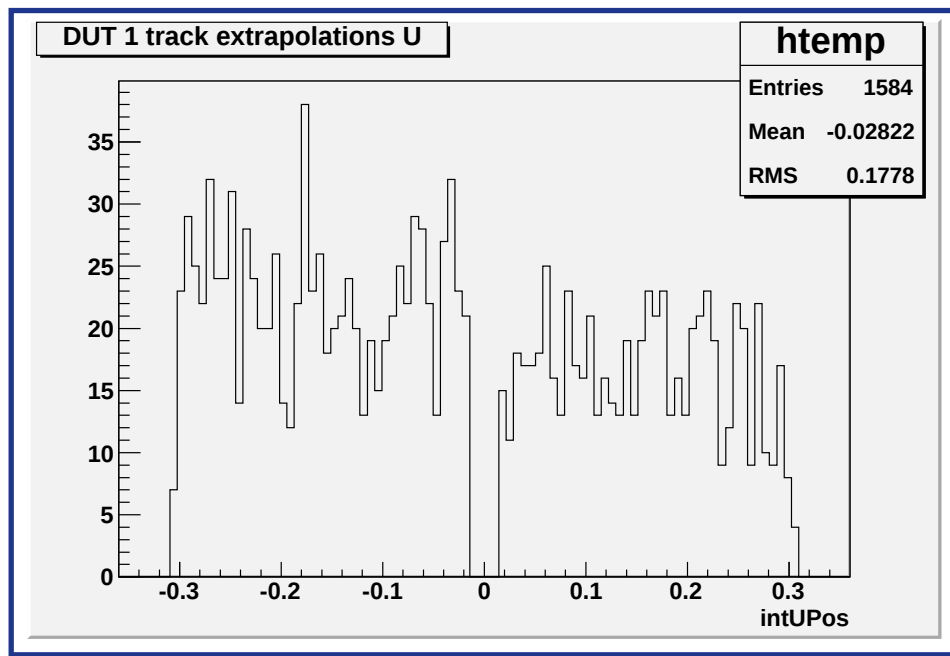
- ◆ **run 2665**
- ◆ DUT 1 = superpix0 chip 12, DUT 2 = superpix0 chip 55
- ◆ angle zero (perpendicular to the beam in the vertical direction)
- ◆ threshold 770 (central value of the tested range)
- ◆ slice = 1 (lowest slice: $y = v = [-0.08 \div -0.04]$ cm)
- ◆ **(BCO%4) == 0** requested to get the DAQ fix by Filippo Giorgi
- ◆ first look at other **later runs** with same configuration, and with different thresholds
- ◆ first look and alignment of some analog MAPS runs (like 2160)

First efficiency estimate for superpix0 DUTs

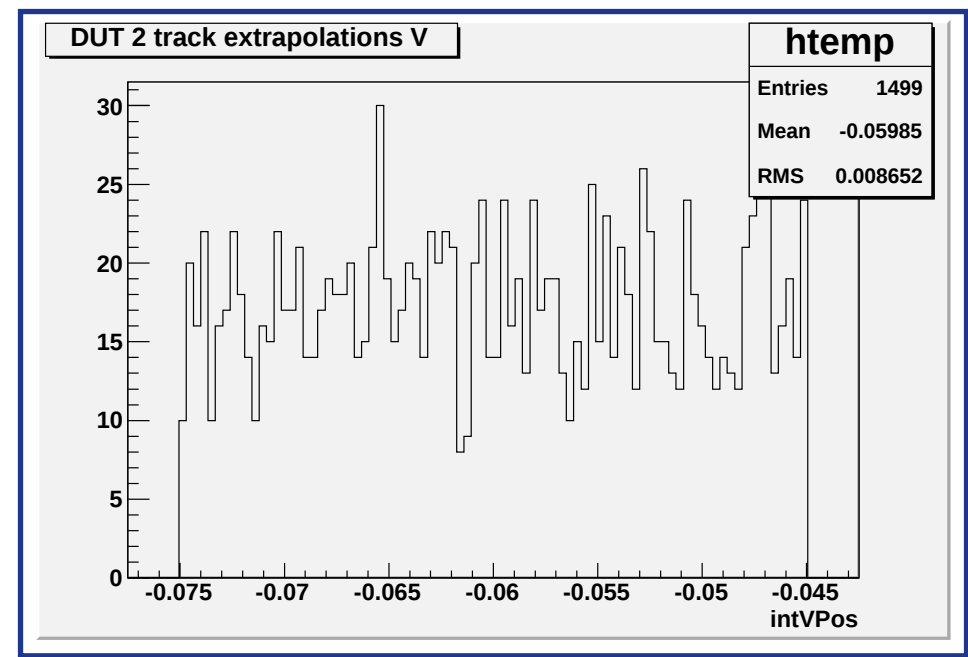
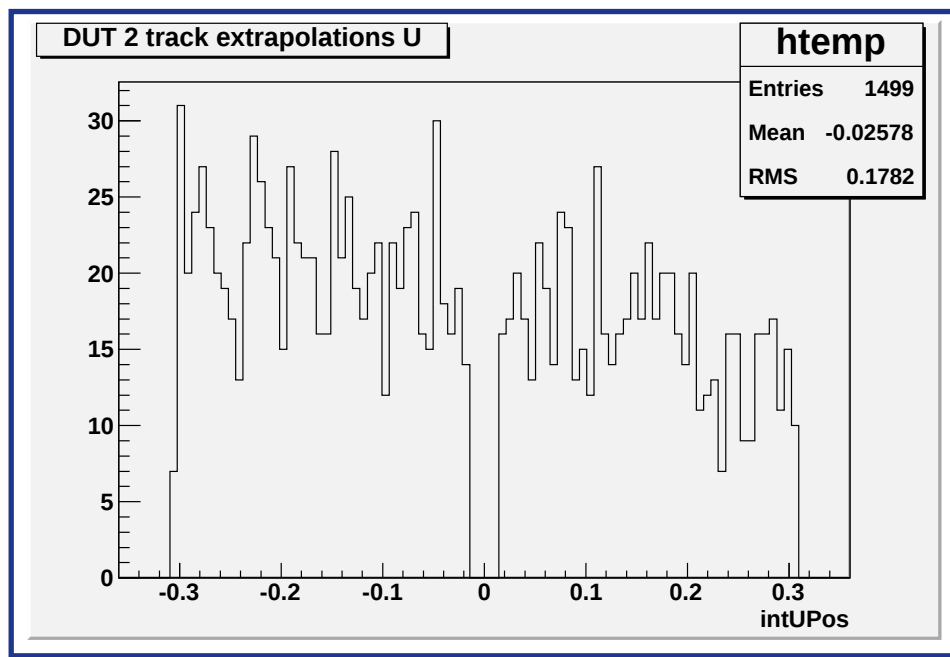
- ◆ DUT 1: $98.30\% \pm 2.53\%$ quoted error is $1/\sqrt{N_{\text{hits}}}$ for now
- ◆ DUT 2: $98.20\% \pm 2.61\%$ quoted error is $1/\sqrt{N_{\text{hits}}}$ for now

- ◆ reconstruct and fit tracks with 6 telescope planes, 6 x and 6 y strip hits required
 - ▶ track reconstruction efficiency $\sim 50\text{--}70\%$ (not yet studied)
- ◆ align telescope with N.Neri algorithm
- ◆ align DUTs by hand in x, y by fitting their residuals with a Gaussian
- ◆ extrapolate tracks to DUTs
- ◆ only consider tracks $50\,\mu\text{m}$ inside in v and $150\,\mu\text{m}$ inside in u (fiducial)
- ◆ don't consider tracks extrapolating into inefficient area at $u \sim 0$
- ◆ require one hit closer than $50\,\mu\text{m}$ in both u and v to the track extrapolation
 - ▶ superpix0 hit resolution (including negligible track extrapolation errors) is $\sim 14.4\,\mu\text{m} \simeq 50/\sqrt{12}$
- ◆ **noise** is not yet fitted but appears to be very small, probably negligible at 770
 - ▶ we are therefore now **overestimating** the efficiency, although I think by a little bit

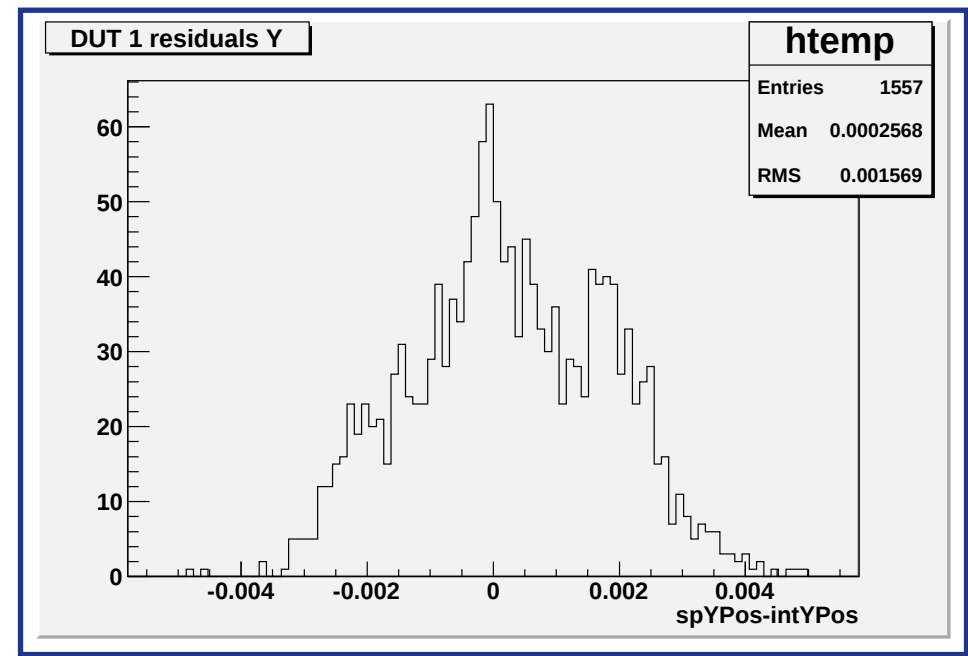
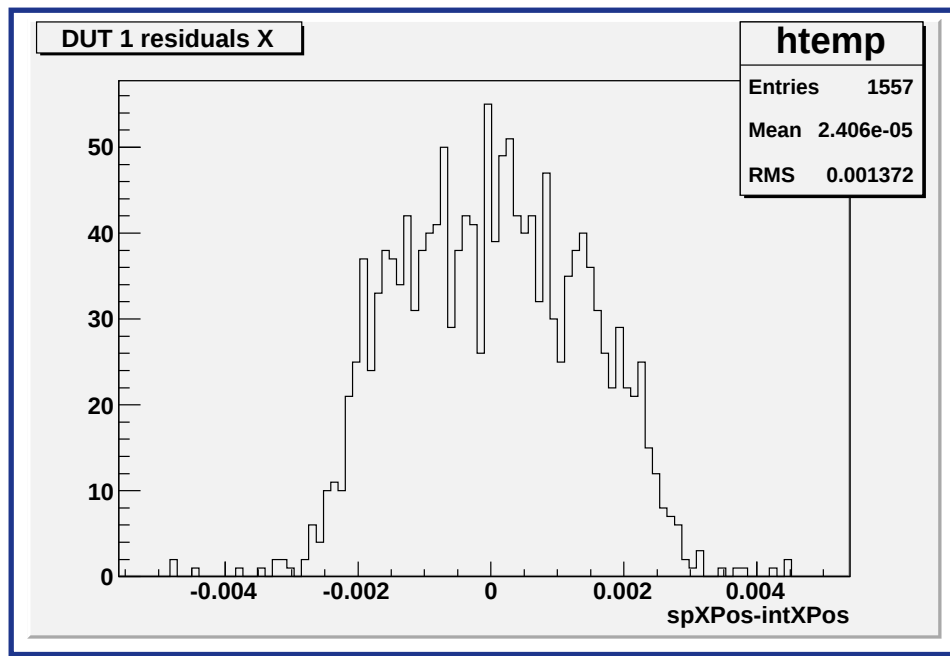
Extrapolated tracks intercepts, DUT 1



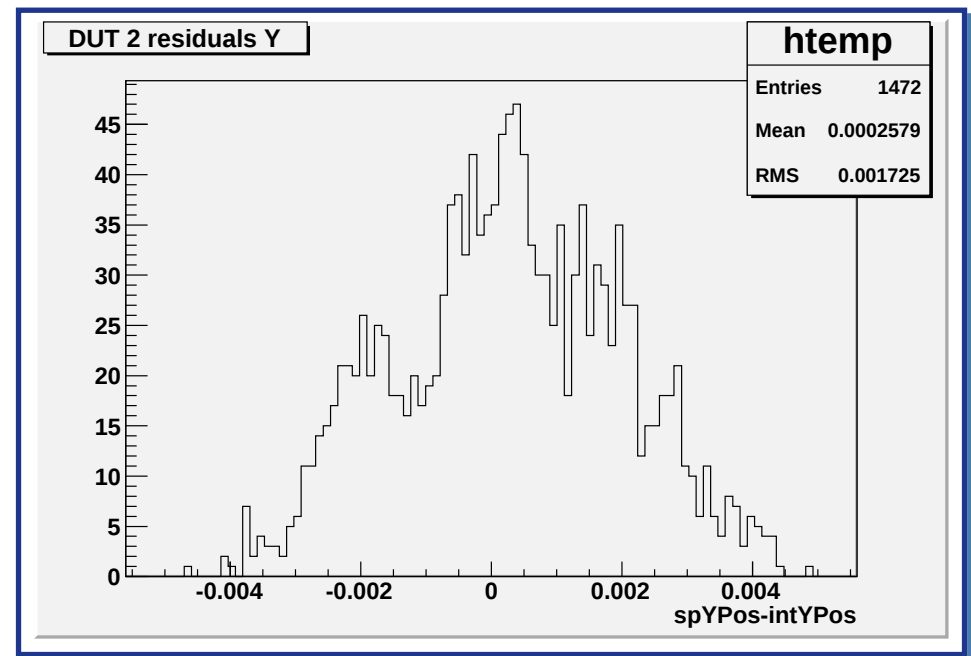
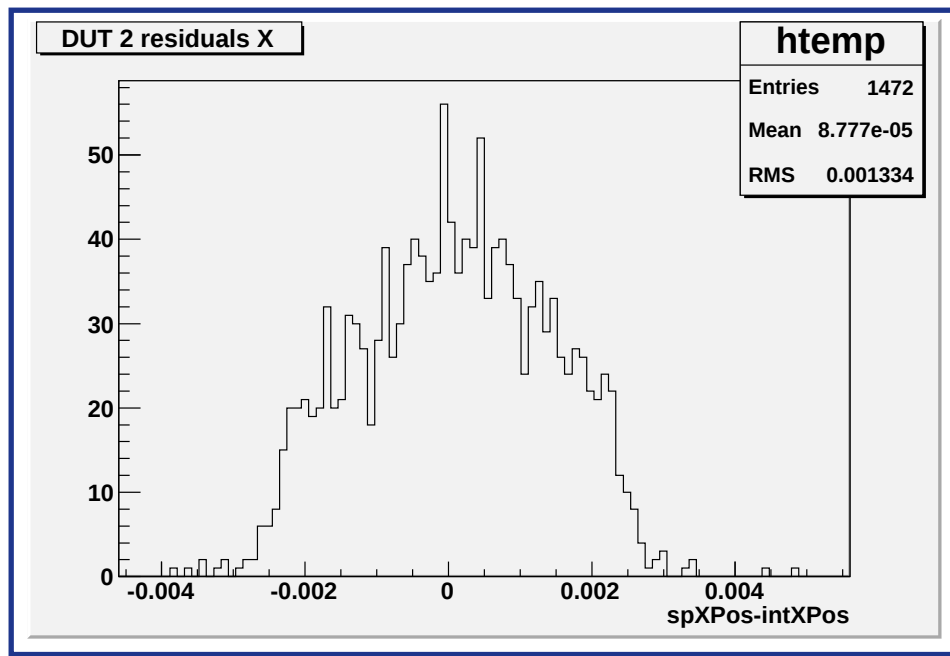
Extrapolated tracks intercepts, DUT 2



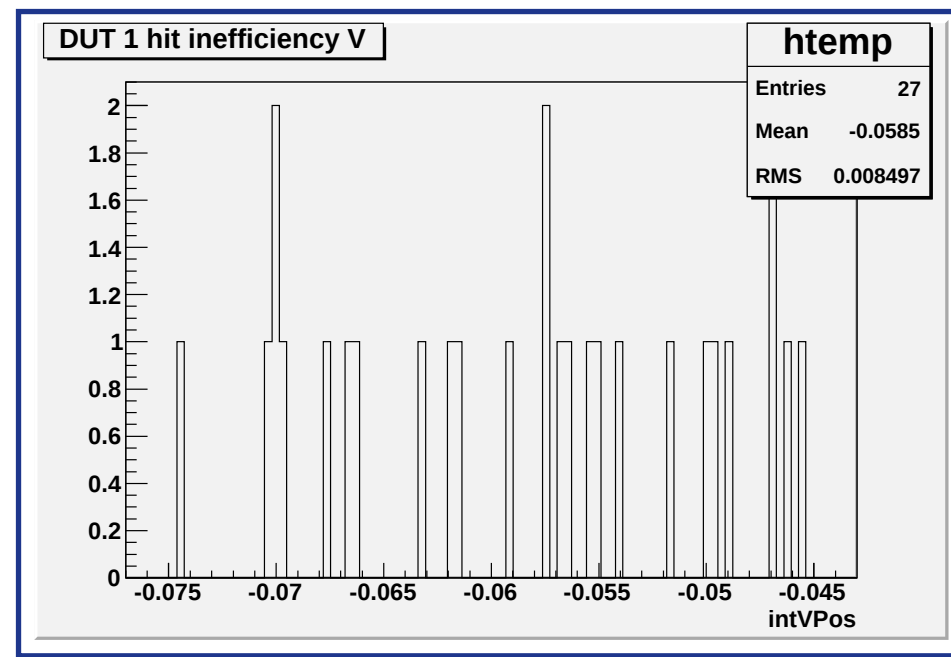
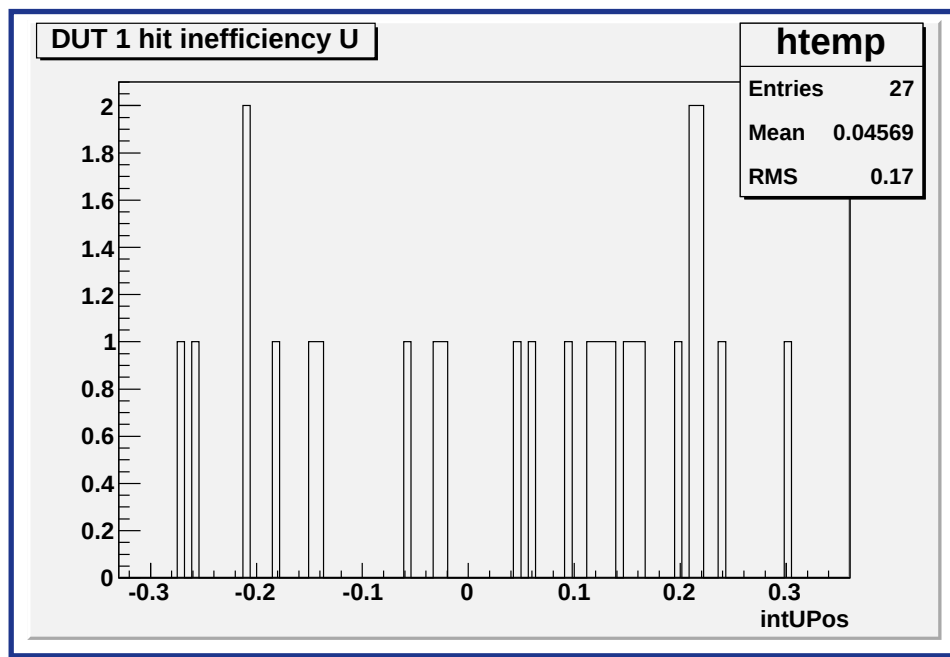
Residuals, DUT 1



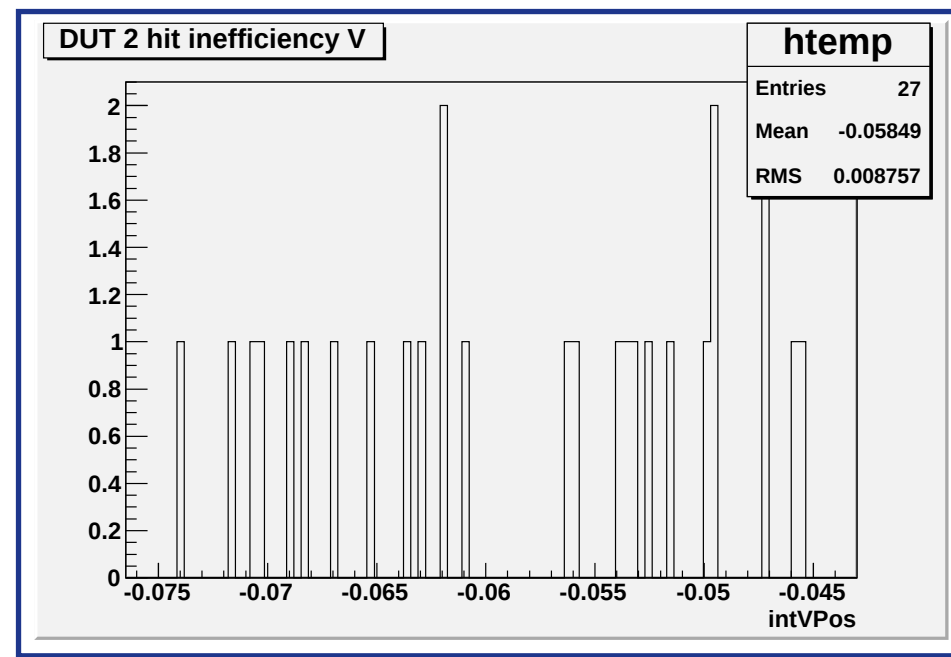
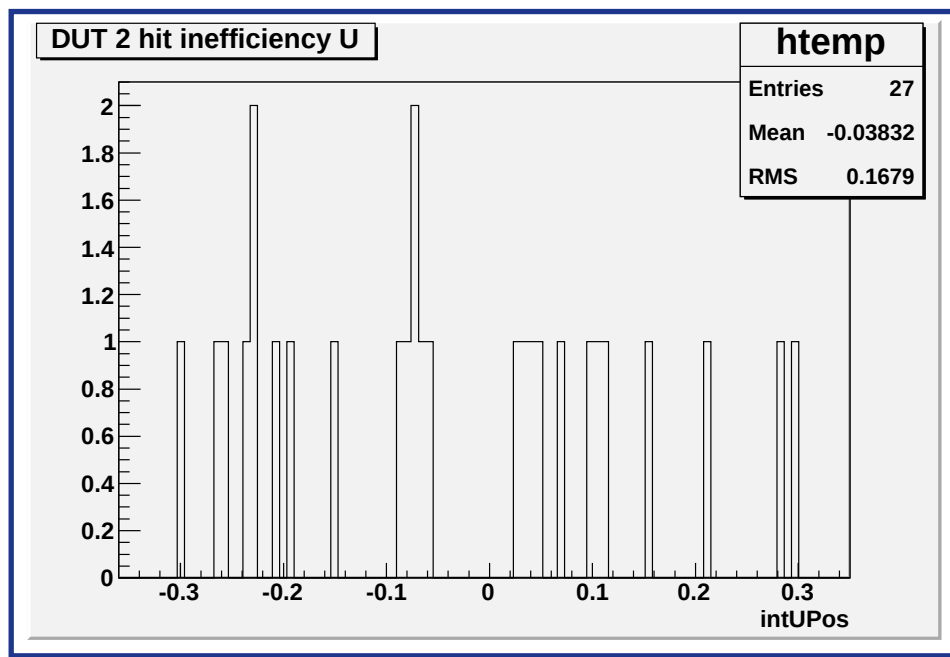
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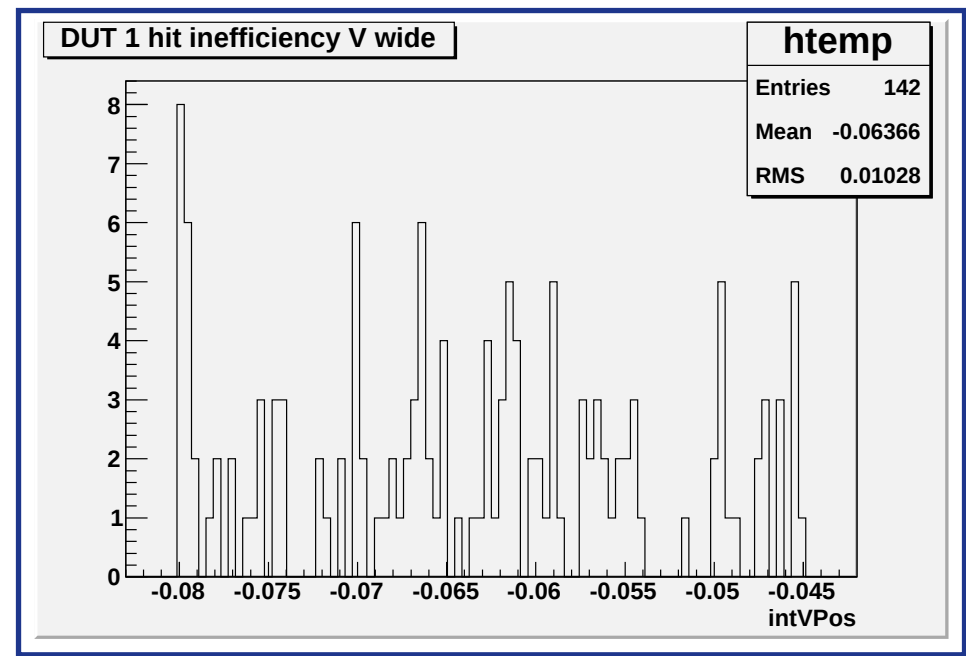
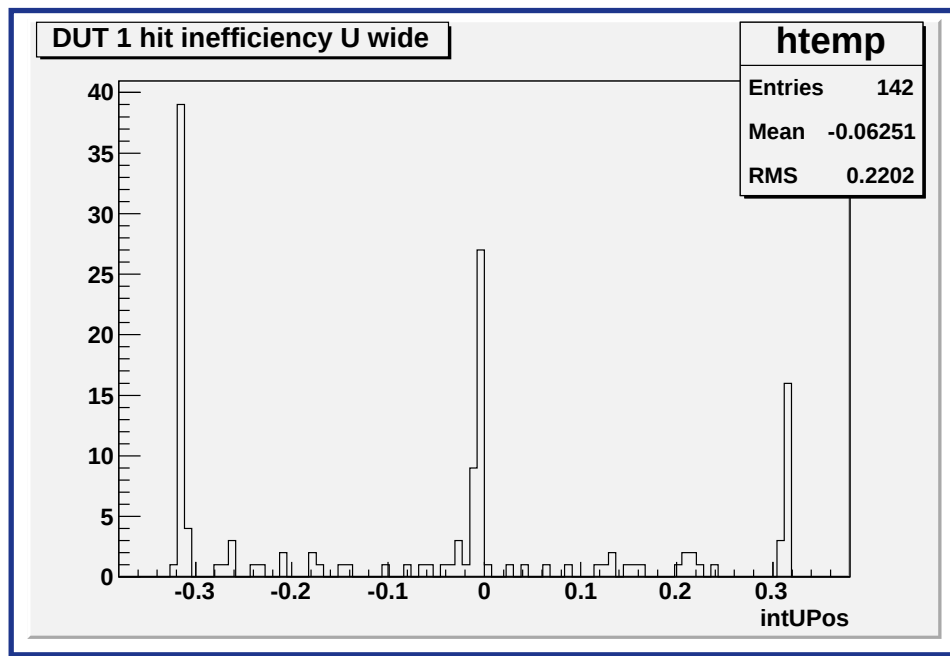
Hit inefficiency, DUT 1



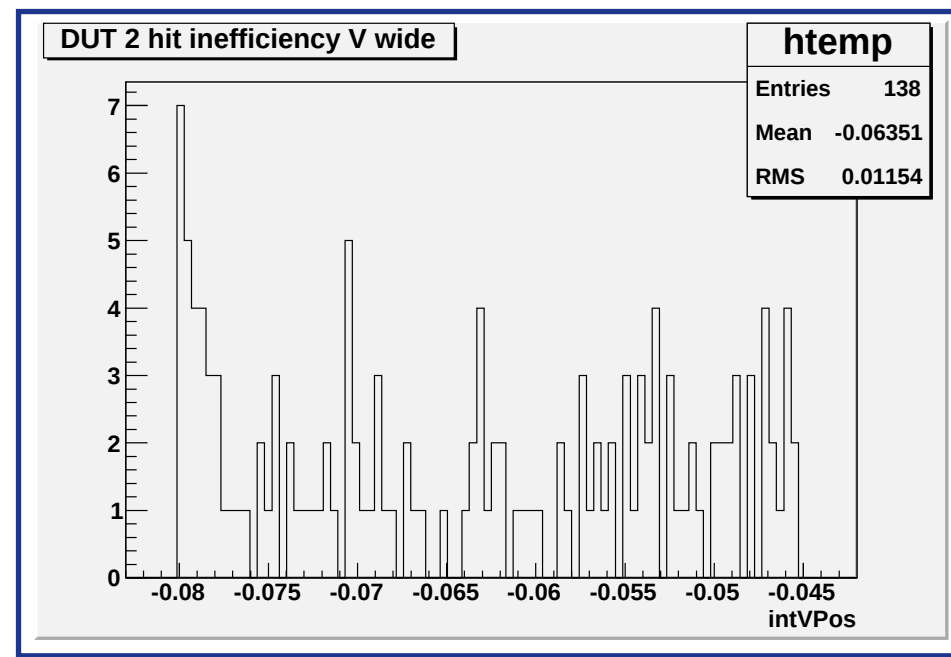
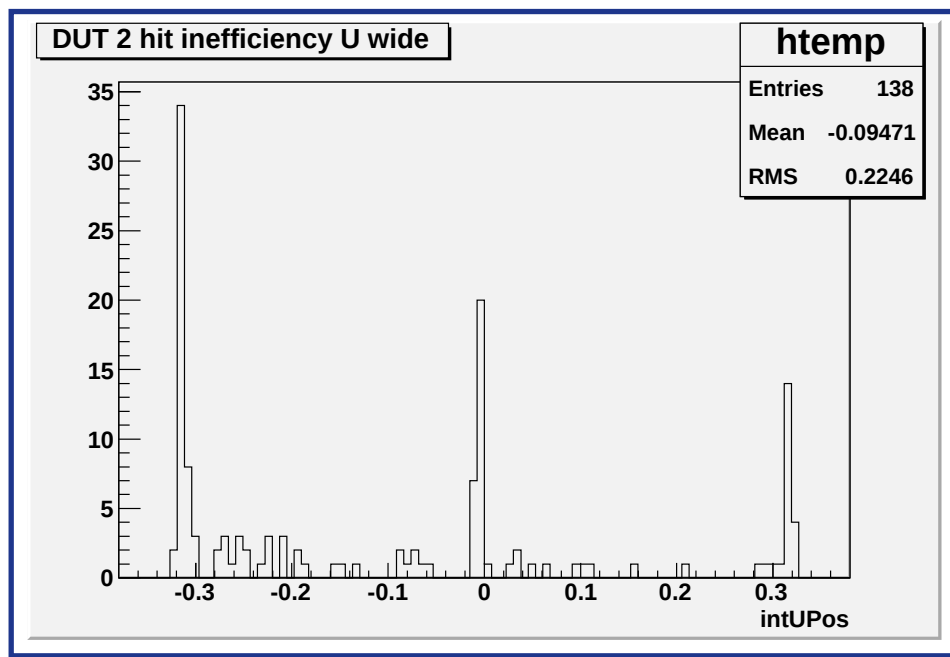
Hit inefficiency, DUT 2



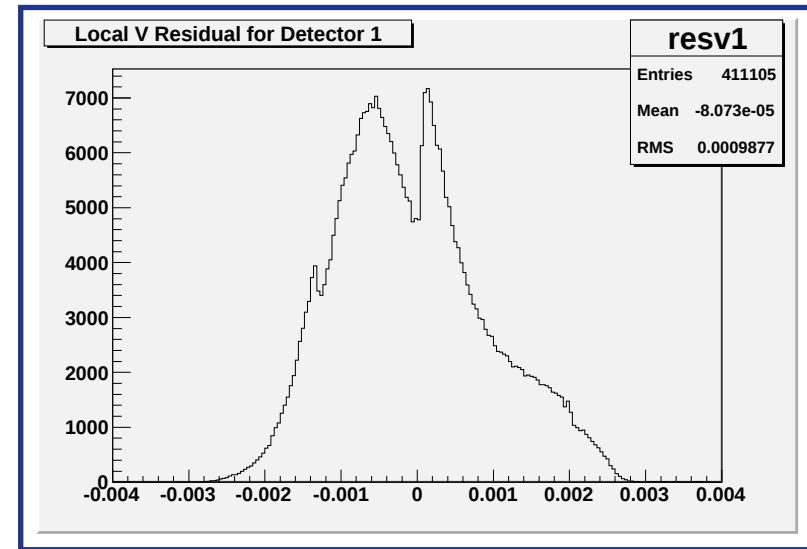
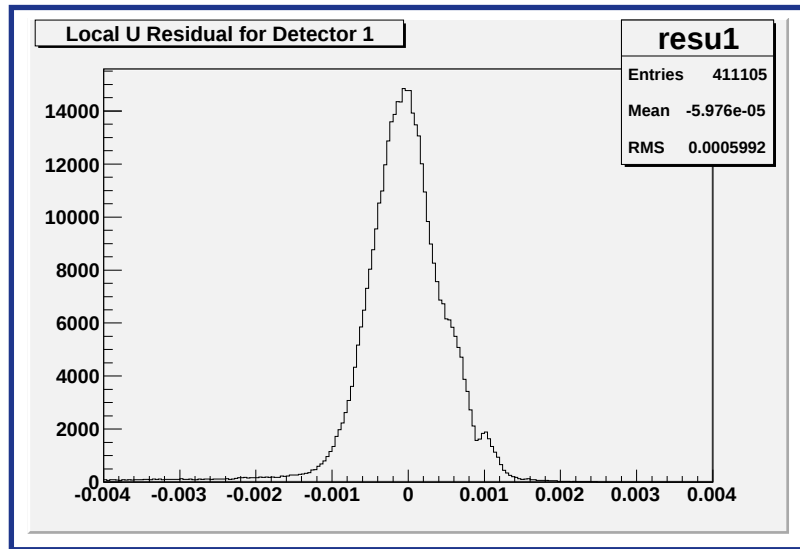
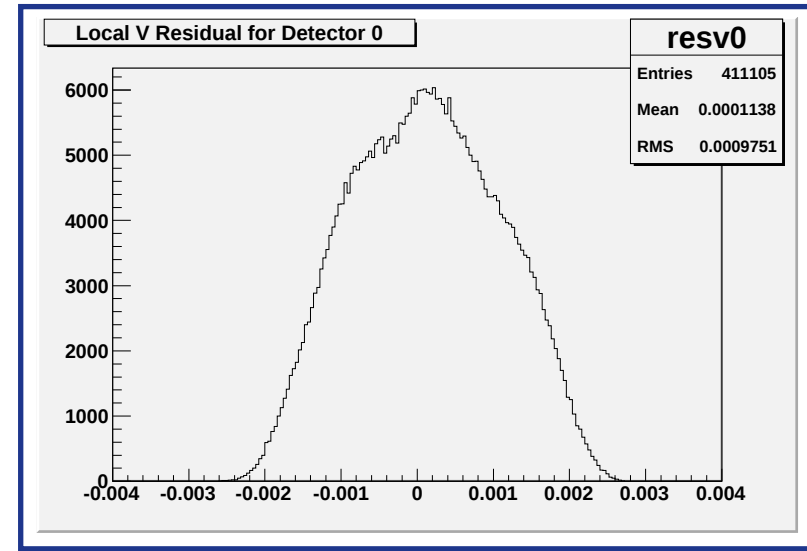
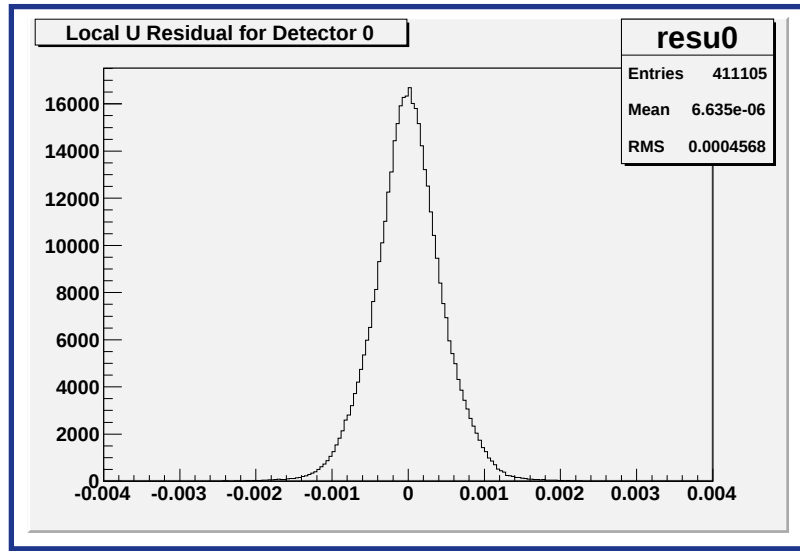
Hit inefficiency, wide, DUT 1



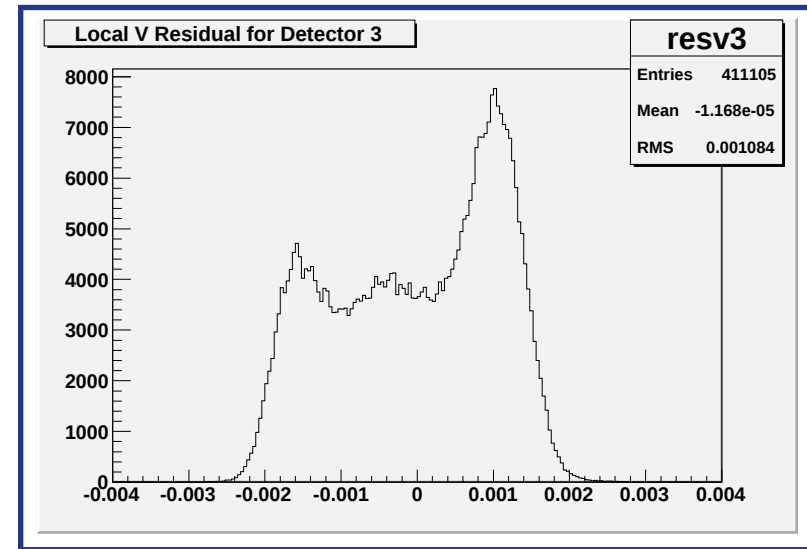
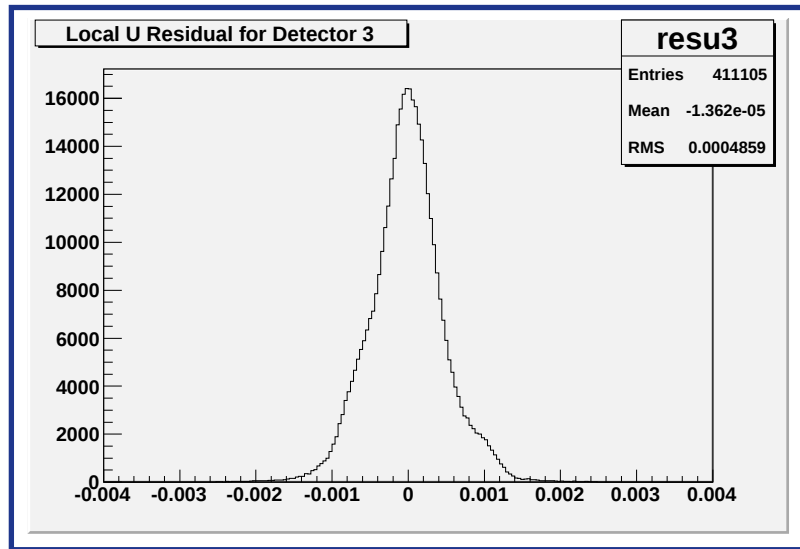
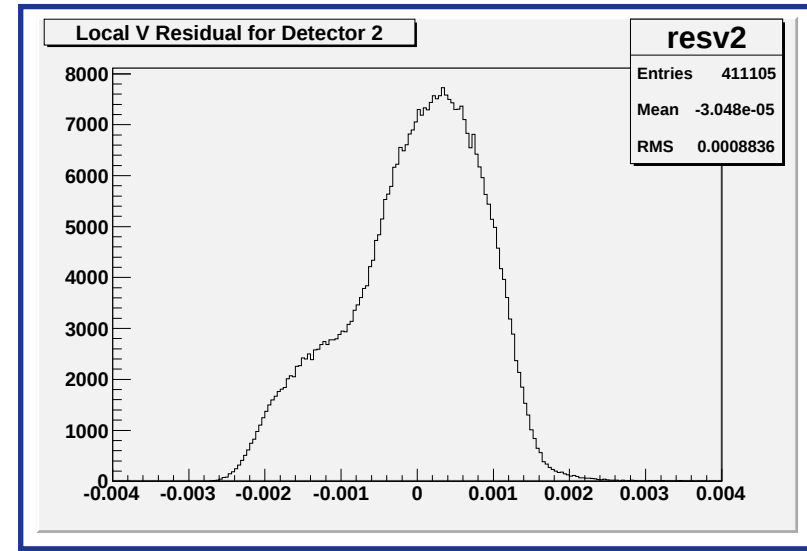
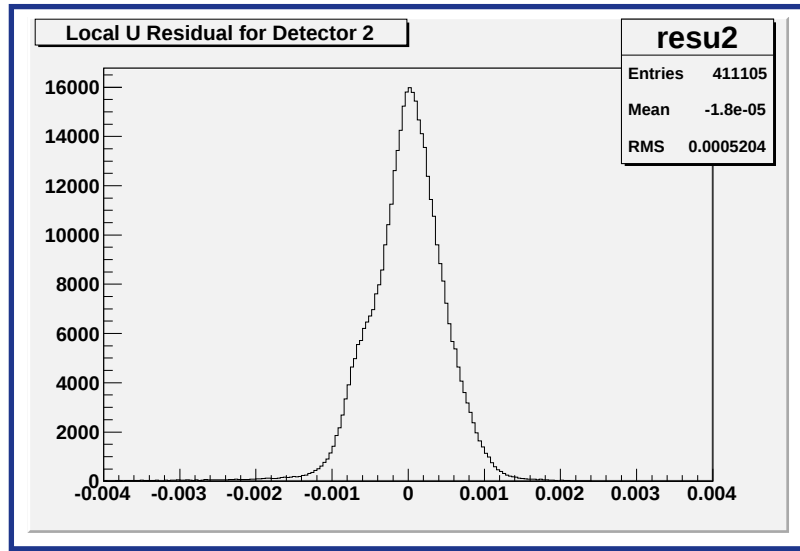
Hit inefficiency, wide, DUT 2

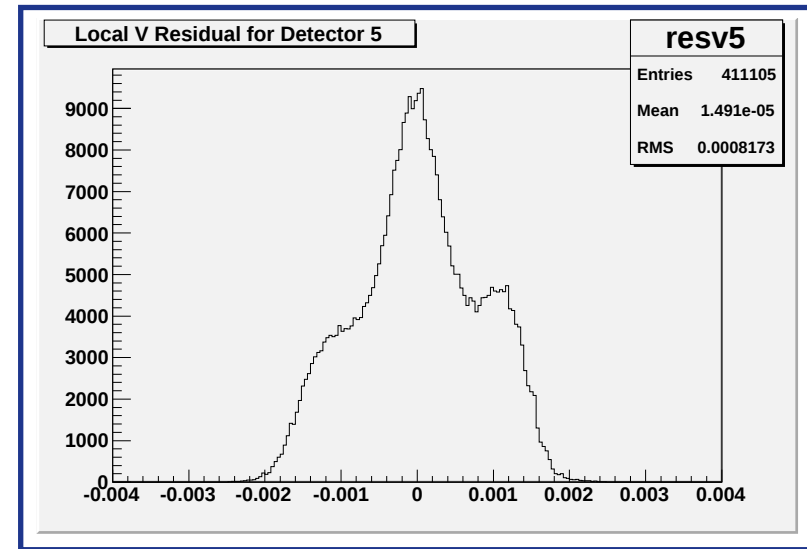
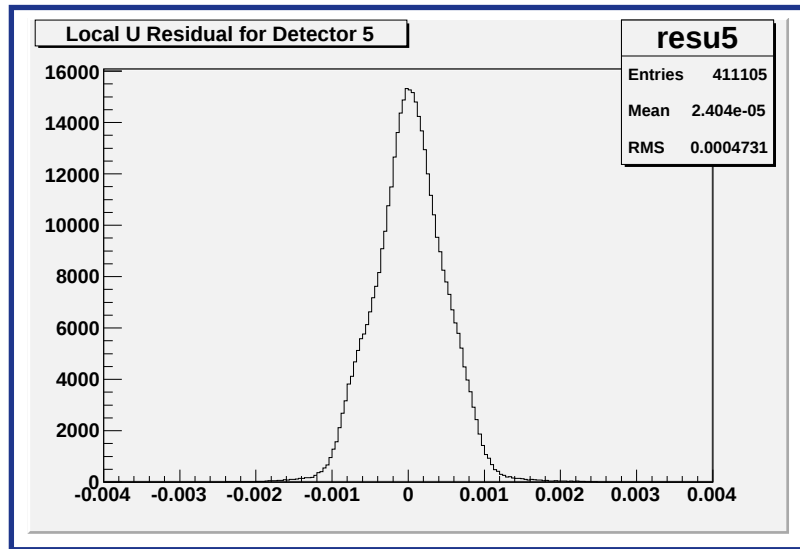
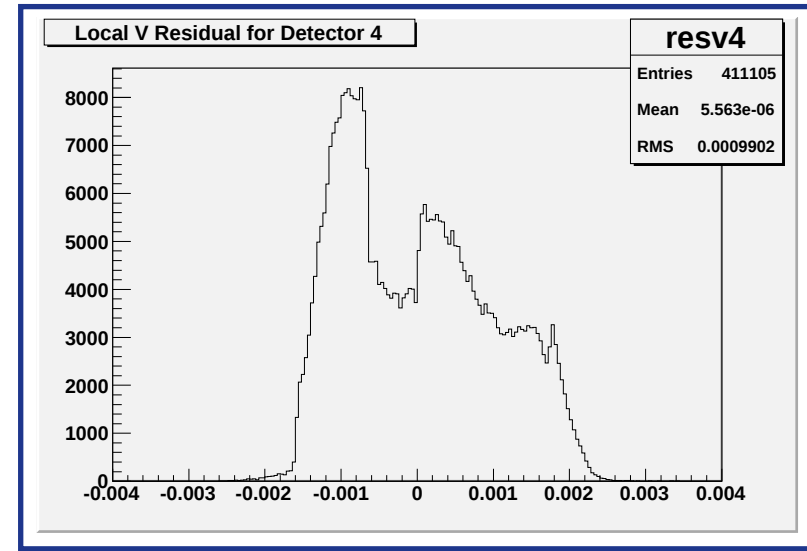
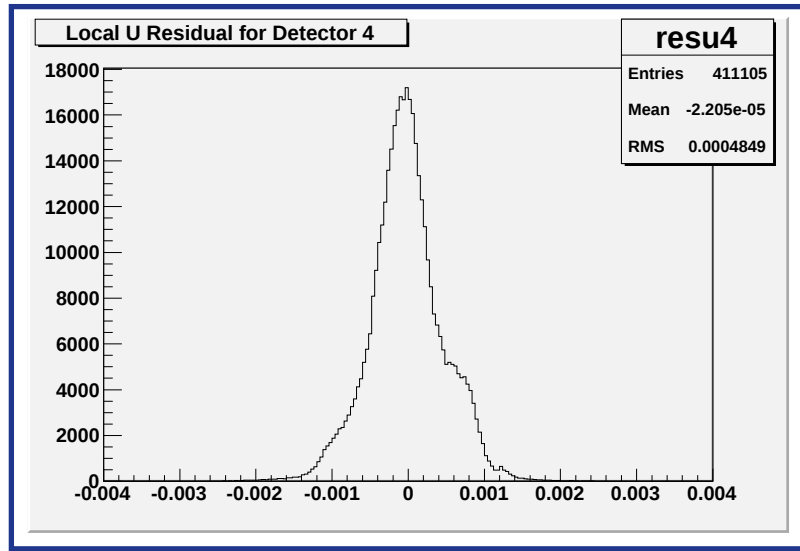


Run 2665, telescope residuals, planes 0, 1

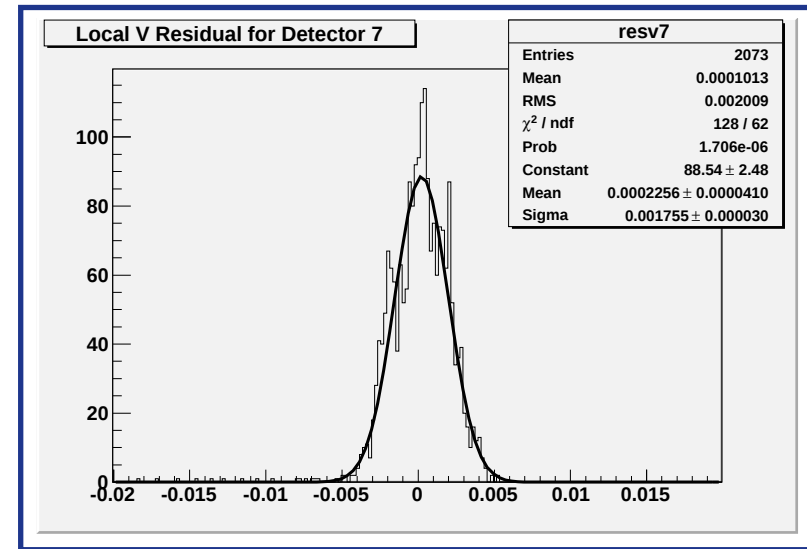
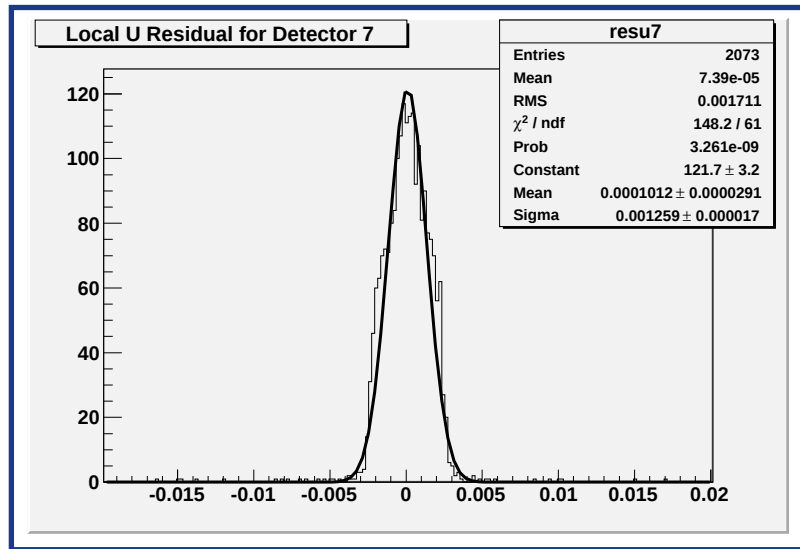
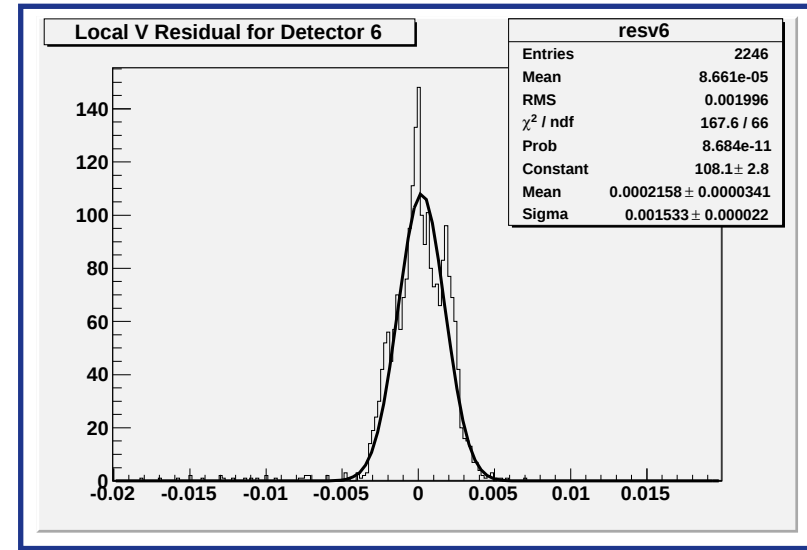
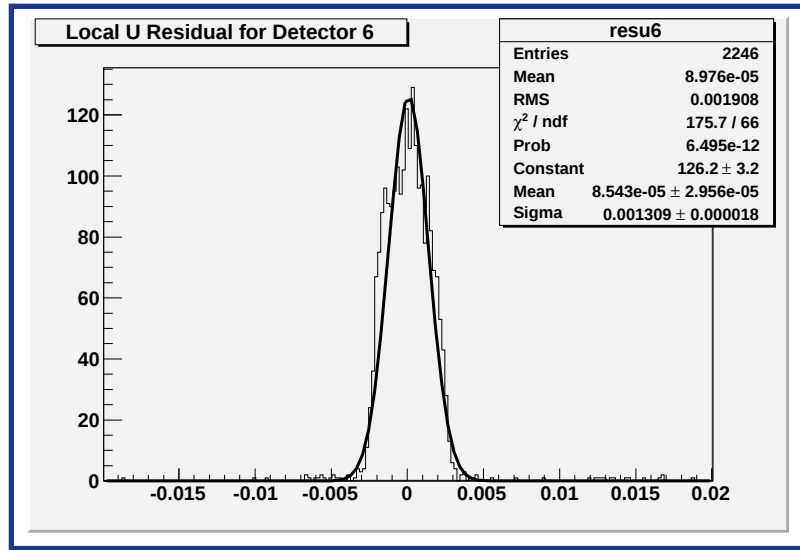


Run 2665, telescope residuals, planes 2, 3

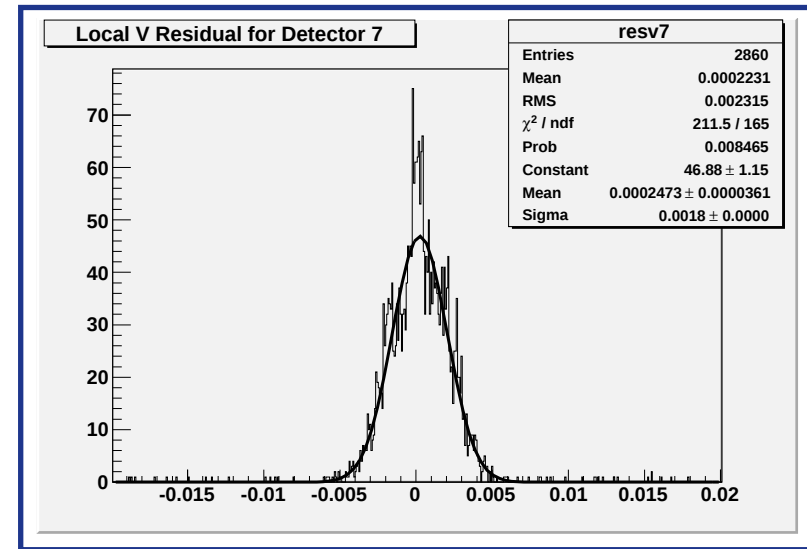
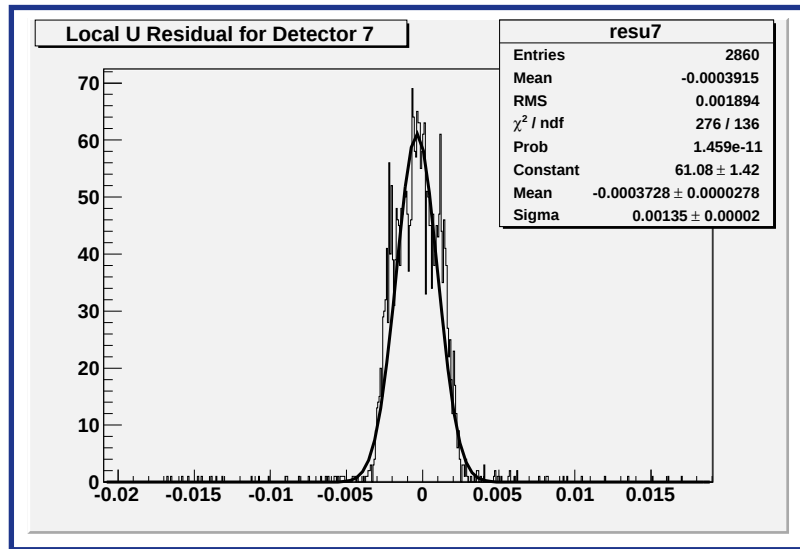
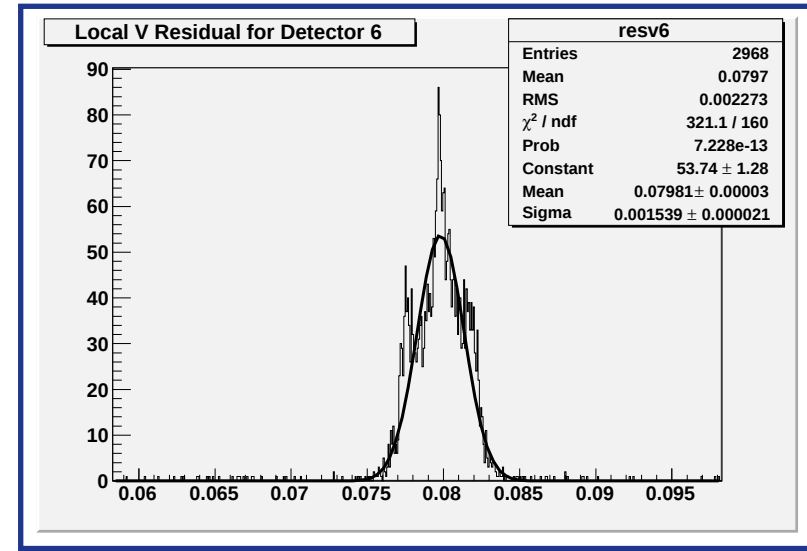
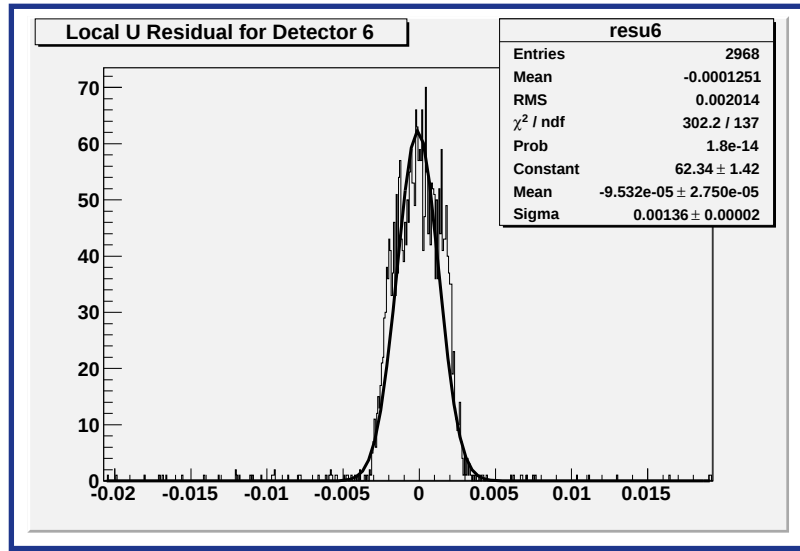


Run 2665, telescope residuals, planes 4, 5

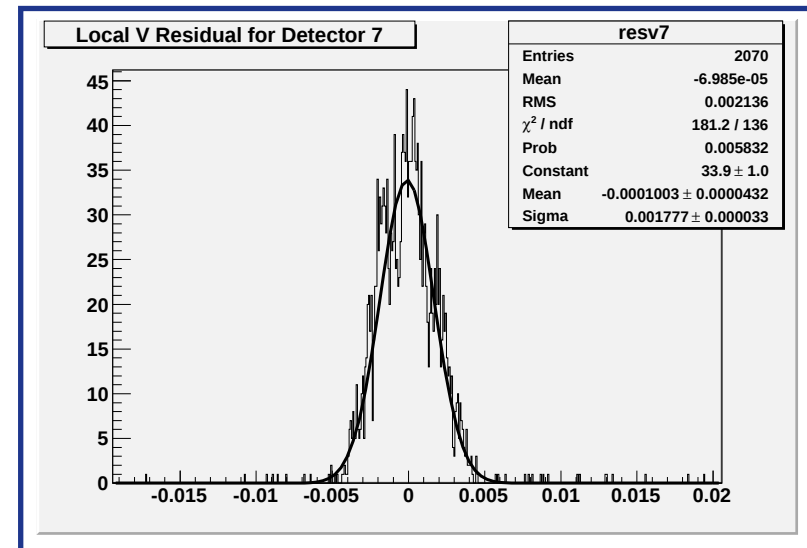
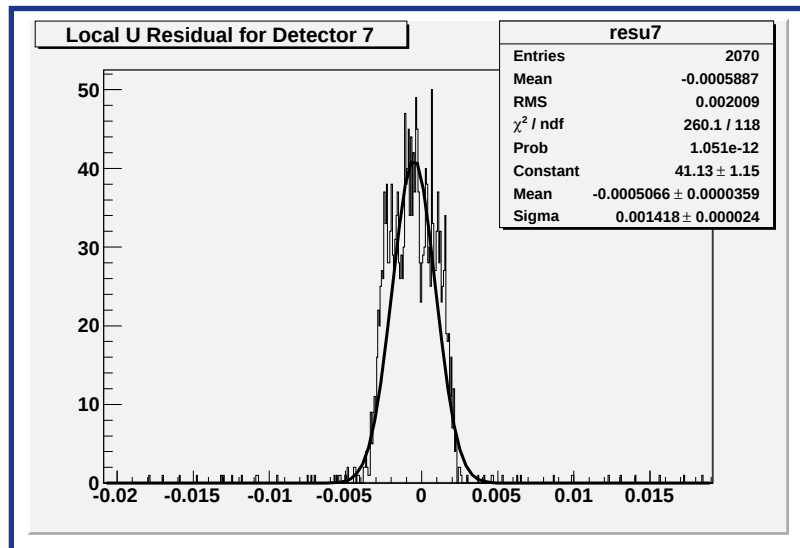
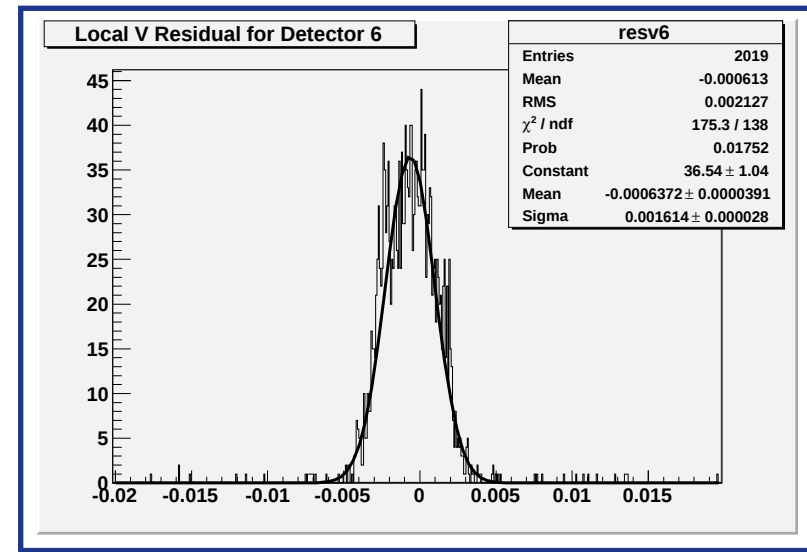
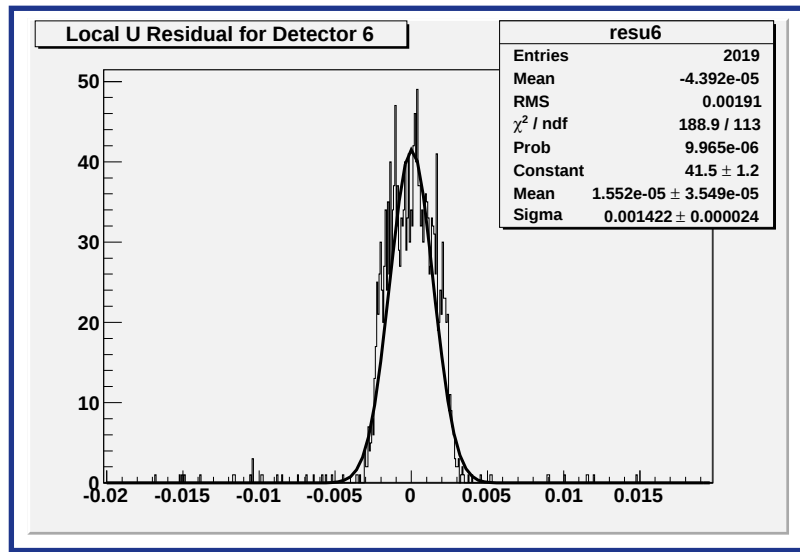
Run 2665, DUTs residuals



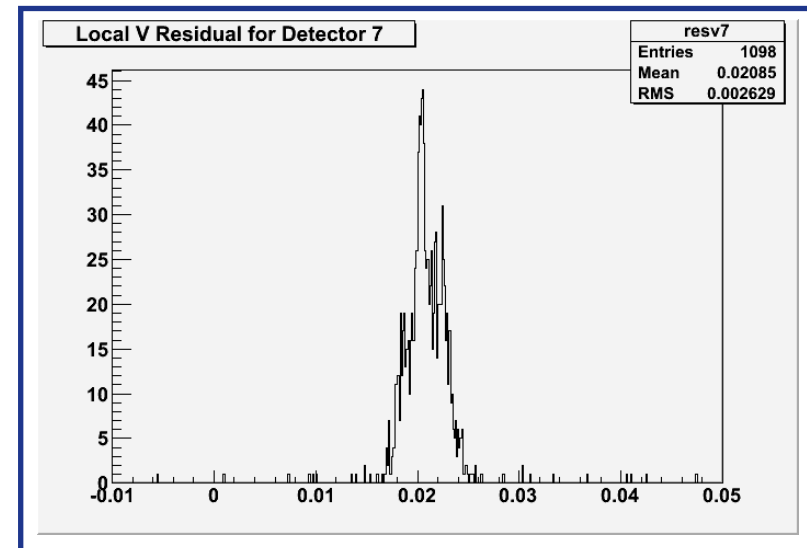
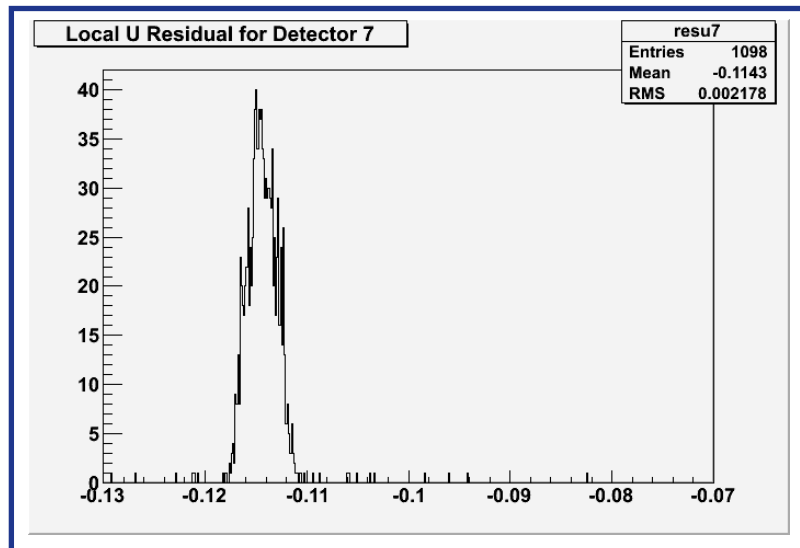
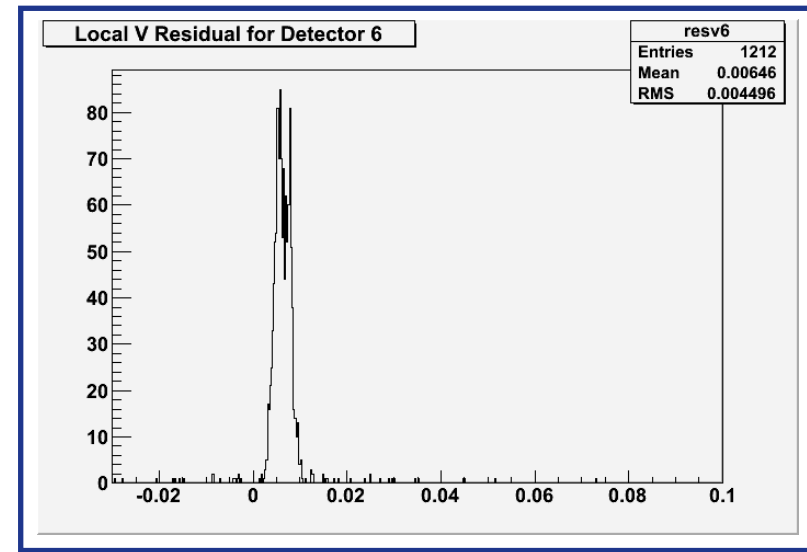
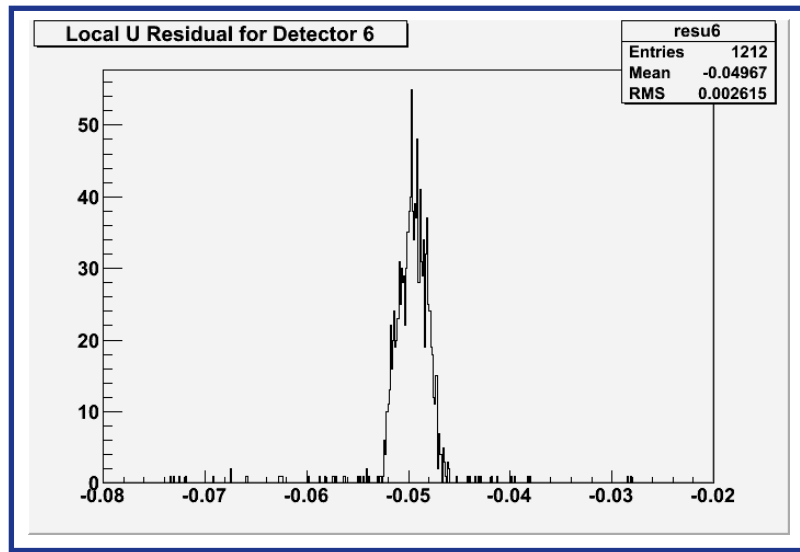
Run 2734, threshold 780, DUTs residuals



Run 2771, threshold 820, DUTs residuals



Run 2678, threshold 760, DUTs residuals



Run 2724, threshold 730, DUTs residuals

