Clustering in Svx Offline Package

Svx Meeting
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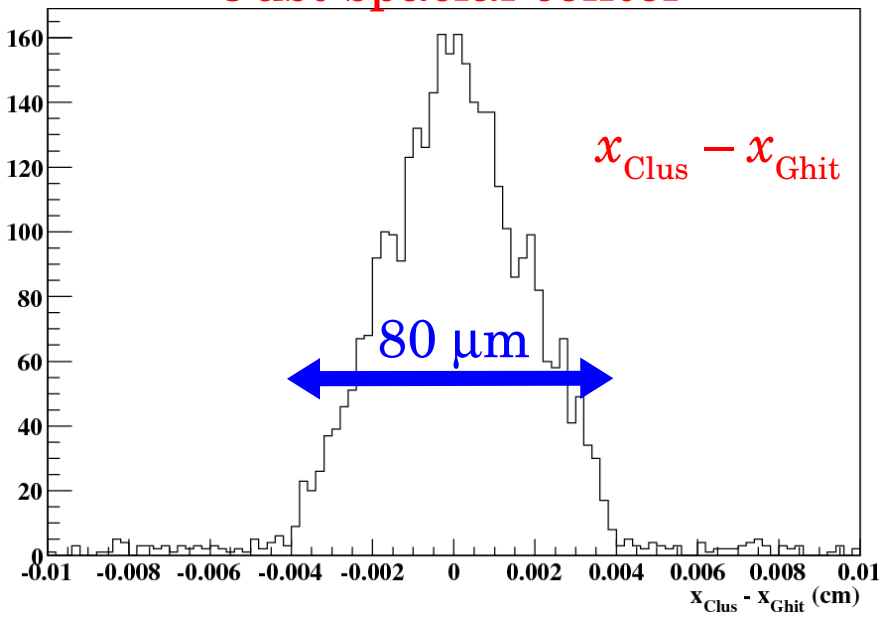
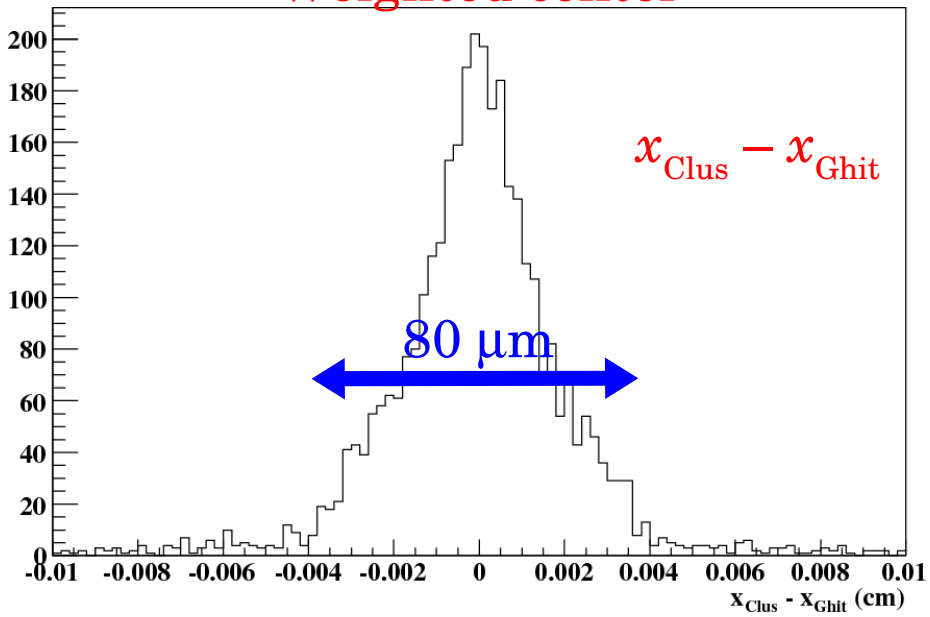
Update 1 – ADC-Weighted Strip Center

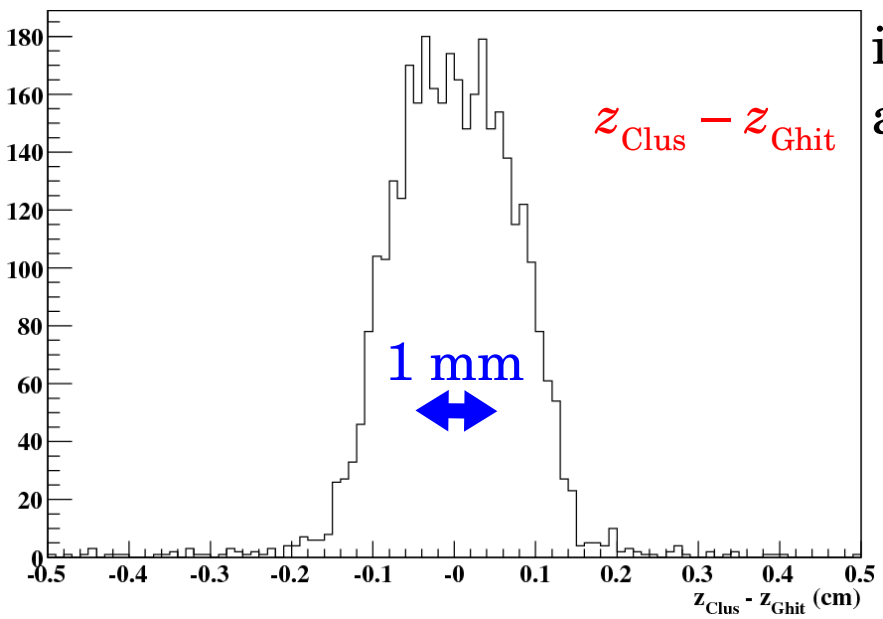
$$ch_{x/u}^{center} = \sum_i ADC^i \, ch_{x/u}^i \, / \sum_i ADC^i$$

Just spacial center

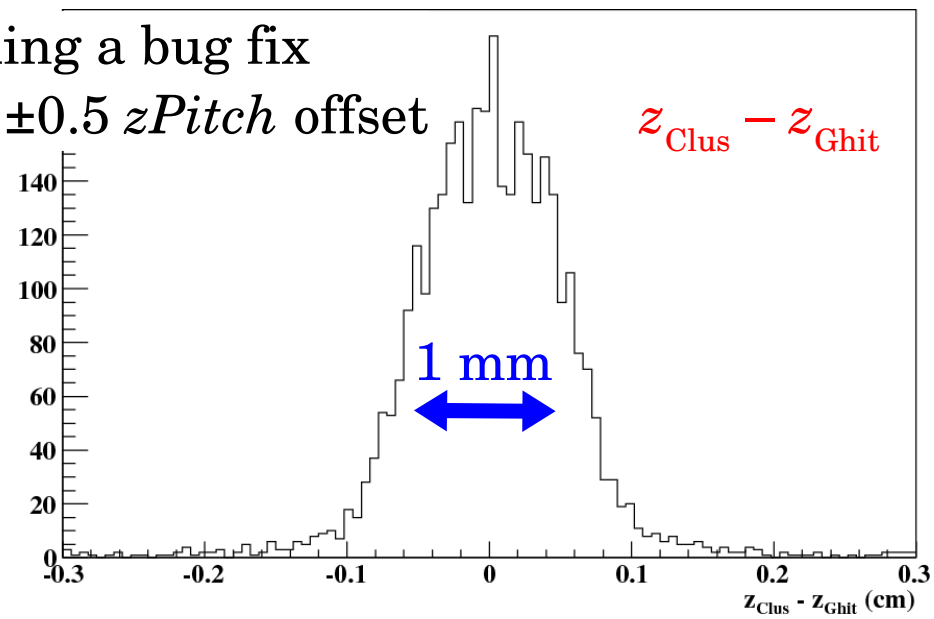


Weighted center





including a bug fix
about ±0.5 *zPitch* offset



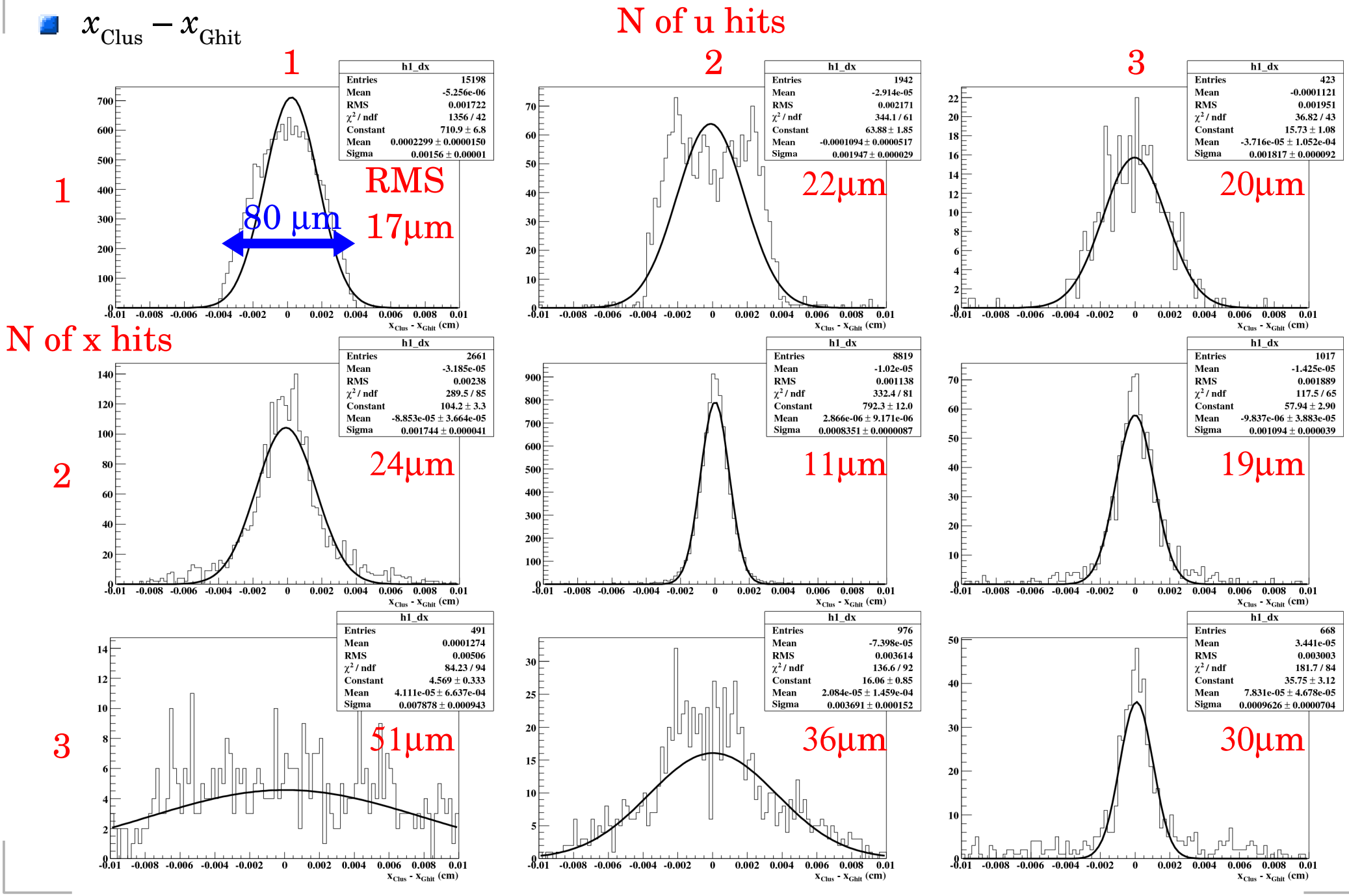
Update 2 – Cluster Position Resolution

- Position resolution is held by SvxClusterv1::size_xyz_global[3][3] and is got by SvxClusterv1::get_size_xyz_global(i, j)
  - the original clustering algorithm doesn't set them (not as I imagined...), although it evaluates them halfway
  - how do global & standalone tracking algorithms obtain resolution?
- Position resolution when charge is shared between strips
  - depends on the number of x & u hits ... **see next two slides**
    - when $(n_{\mathrm{xhit}}, n_{\mathrm{uhit}}) = (1, 1)$, x resolution is better than $width/\sqrt{12}$ since a hit at strip edge causes $n_{\mathrm{xhit}} = 2$
  - for a cluster with $(n_{\mathrm{xhit}}, n_{\mathrm{uhit}})$, I set its x resolution to the RMS of $x_{\mathrm{Clus}} - x_{\mathrm{Ghit}}$ in the $(n_{\mathrm{xhit}}, n_{\mathrm{uhit}})$ condition, using the RMS in $n_{\mathrm{hit}} = 3$ when $n_{\mathrm{hit}} > 3$

- Both two updates have been committed to CVS

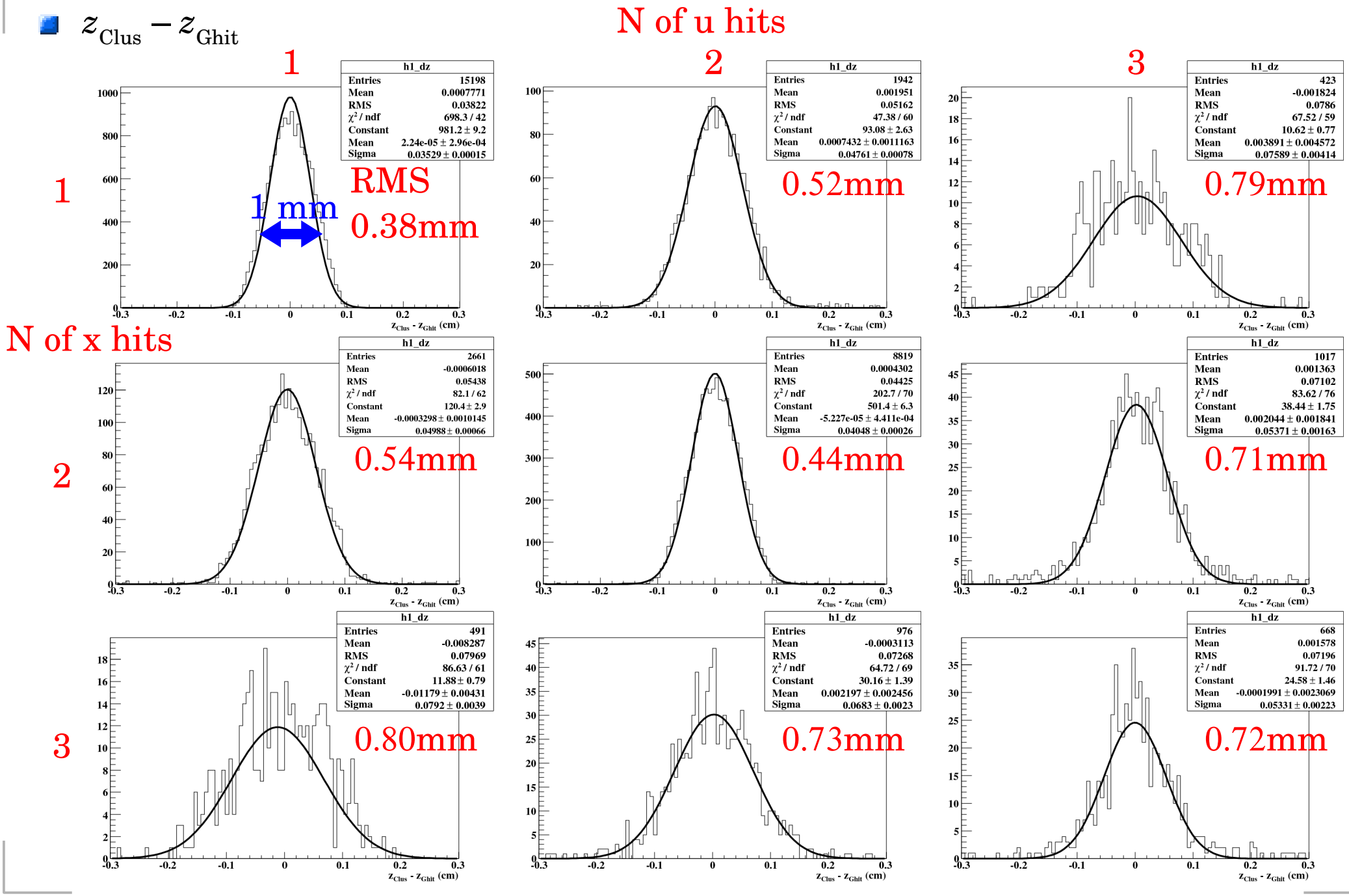
Update 2 – Cluster Position Resolution

- $x_{\mathrm{Clus}} - x_{\mathrm{Ghit}}$



Update 2 – Cluster Position Resolution

- $z_{\mathrm{Clus}} - z_{\mathrm{Ghit}}$



Backup Slides...

Reconstruction Configuration

- Sensor arrangement & energy deposit
  - no dead area between two sections, rotation-symmetric section layout
  - 29 u-strips (chan. 0 ~ 28) cover both side of sensor. channel 0 & 383 adjoin
  - 1 MIP = 100 ADC counts in each x/u readout

- Charge sharing between strips
  - Sasha's algorithm, only over x direction

    implement z-direction sharing

- Charge sharing between x & u readouts
  - Manabu's algorithm, energy asymmetry = 0.1 (changable)

- Noise
  - gaussian with σ_{ADC} = 10.2 (changable) per strip
  - noises with ADC < 10.2 are suppressed (not added in SvxRawhitList)

- (continue to next page...)

Reconstruction Configuration (cont'd)

- X-strips clustering & u-strips clustering
  - just gather continuous fired strips
  - N of strips in a cluster **not** limited (like < 3) to see how it is in reality
    determine how it is treated
  - strips with ADC >= 21 used
    check dependences on this threshold

- X-u crossing (also called “cluster”) finding
  - strip groups with summed ADC >= 40 used
    check dependences on this threshold
  - cluster position = where the ADC-weighted center of x-strips crosses the ADC-weighted center of u-strips
  - no energy asymmetry cut applied ... it can reduce ghosts a bit
  - resolution not evaluated
    - “width / √12” for one fired strip, but how it is for multiple fired strips?