

Update on Phi Studies
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DC06 Decay File

- Uses SVV_HELAMP model
- A little calculus is needed

$$A_0 = H^0$$

$$A_{\parallel} = \frac{1}{\sqrt{2}}(H^+ + H^-)$$

$$A_{\perp} = \frac{1}{\sqrt{2}}(H^+ - H^-)$$

$$|H^+| = 0$$

$$\arg(H^+) = 0$$

$$|H^0| = 1.0$$

$$\arg(H^0) = 0.0$$

$$|H^-| = 0.6$$

$$\arg(H^-) = 0.5$$

$$|A_0| = 1.0$$

$$\arg(A_0) = 0.0$$

$$|A_{\parallel}| = |A_{\text{perp}}| = \frac{0.6}{\sqrt{2}}$$

$$\arg(A_{\parallel}) = 0.5$$

$$\arg(A_{\perp}) = 0.5 + \pi$$

DC06-based ToyMC

- There are different parameters than usual ToyMC
- Ideal particle identification ($w_{\text{mis}}=0$)
- Ideal resolution and acceptance .

$$\delta_1 = \arg\left(\frac{A_{\perp}}{A_{\parallel}}\right) = \pi$$

$$\delta_2 = \arg\left(\frac{A_{\perp}}{A_0}\right) = \pi + 0.5$$

$$R_{t0} = \frac{|A_0|^2}{|A_0|^2 + |A_{\parallel}|^2 + |A_{\perp}|^2} = 0.736$$

$$R_{t\parallel} = \frac{|A_{\parallel}|^2}{|A_0|^2 + |A_{\parallel}|^2 + |A_{\perp}|^2} = 0.132$$

$$R_{t\perp} = \frac{|A_{\perp}|^2}{|A_0|^2 + |A_{\parallel}|^2 + |A_{\perp}|^2} = 0.132$$

$$\Gamma_L = 0.72 \text{ ps}^{-1}$$

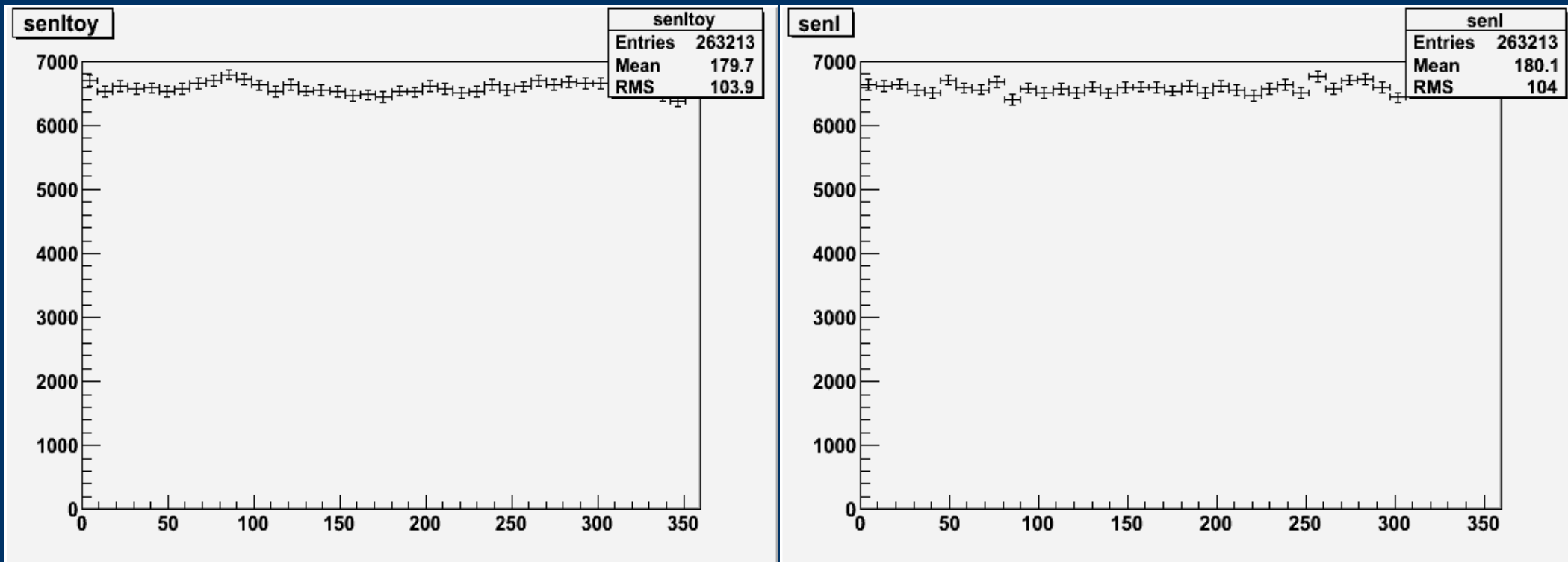
$$\Gamma_H = 0.65 \text{ ps}^{-1}$$

$$\Delta m_s = 20.0 \text{ ps}^{-1}$$

$$\phi_s = 0.04?$$

DC06 TOY vs DC06 MCTRUTH

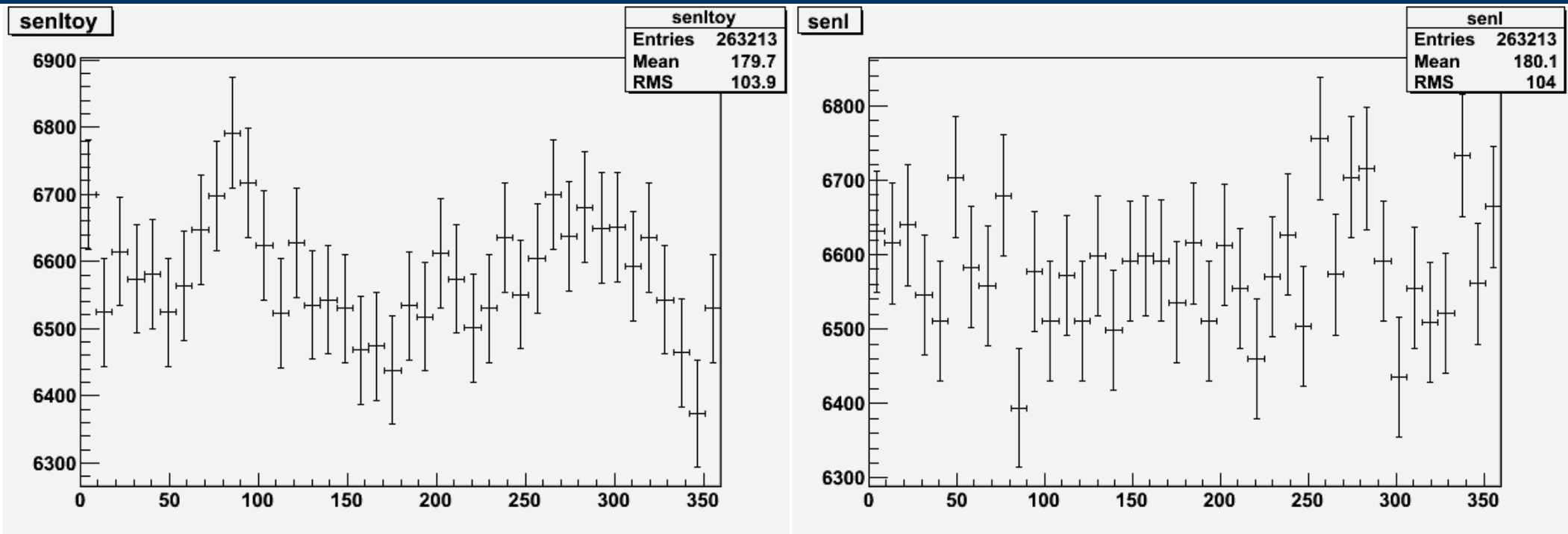
- Entries vs angle (in degrees)



- Small oscillation

DC06 TOY vs DC06 MCTRUTH

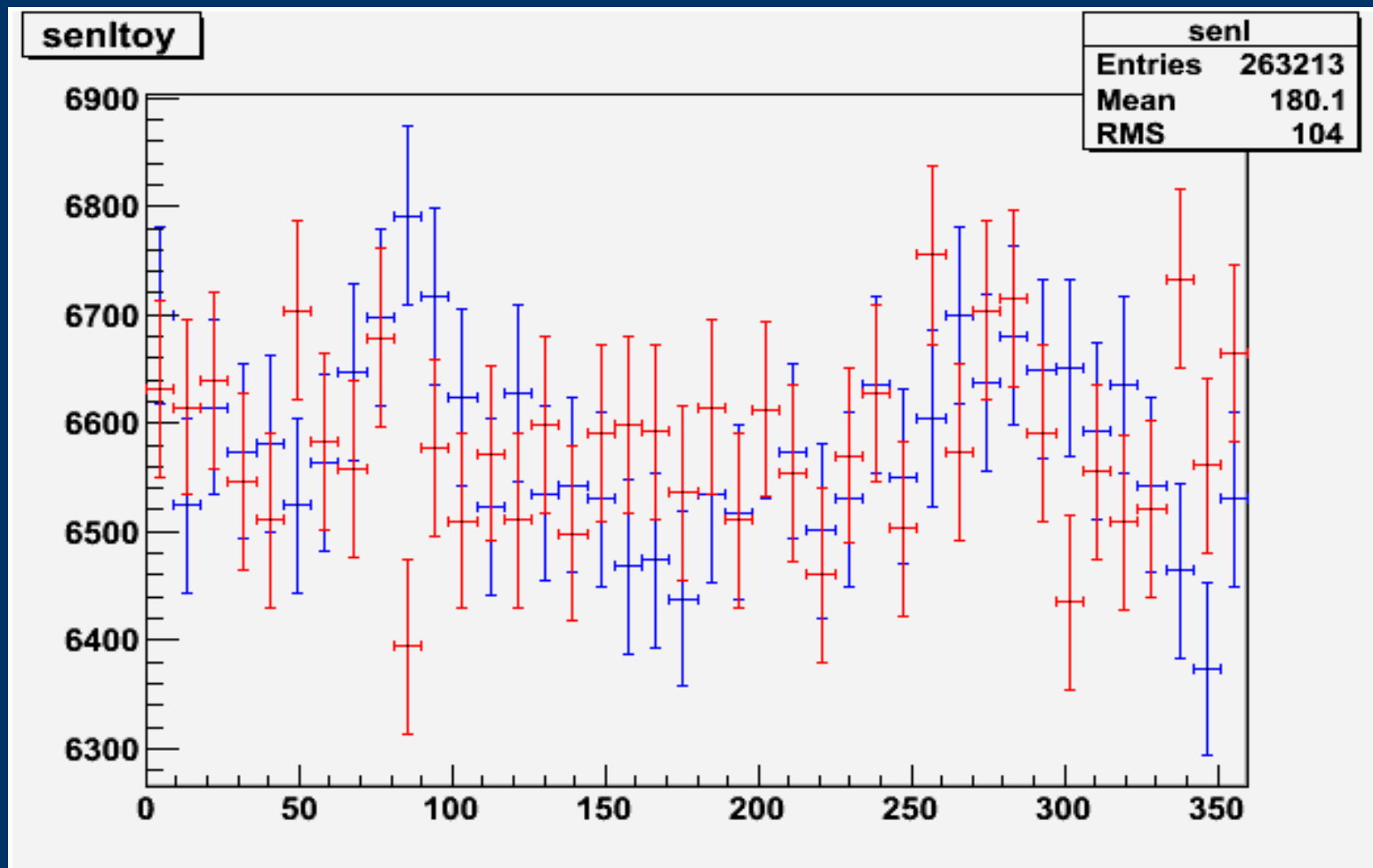
- Entries vs angle (in degrees) zoomed



- Calculus needs more precision ?

DC06 TOY vs DC06 MCTRUTH

- Entries vs angle (in degrees) zoomed & combined (toyMC in blue, MCTruth in red)



Other updates

- Preliminary tests show that the “missing” particles in the MCTRUTH tuple were still there.
- Faulty code was corrected.
- Last DST added to the datacard.
- New run on all DC06 statistic (306k) is in the work.