We must translates the mean ypos position into a scattering angle, i.e.

$$\begin{aligned} \theta_{scat}^{MC} &= \theta_0^{MC} + \tan^{-1}(< ypos >^{MC} /L), \\ \theta_{scat}^{Data} &= \theta_0^{Data} + \tan^{-1}(< ypos >^{Data} /L), \end{aligned}$$

where

$$\begin{aligned} \theta_0^{MC} &= \text{central angle of the ndet in the MC,} \\ \theta_0^{Data} &= \text{central angle of the ndet in the Data,} \\ < ypos >^{MC} &= \text{average ypos position in MC,} \\ < ypos >^{Data} &= \text{average ypos position in Data.} \end{aligned}$$

We must make the scattering angles for data and MC agree. This implies that

$$\begin{aligned} \theta_0^{Data} &= \theta_{scat}^{MC} - \tan^{-1}\left(\frac{< ypos >^{Data}}{L}\right) \\ &= \theta_0^{MC} + \tan^{-1}\left(\frac{< ypos >^{MC}}{L}\right) - \tan^{-1}\left(\frac{< ypos >^{Data}}{L}\right) \end{aligned}$$

To make ypos agree for data and MC, we must also make $\theta_0^{MC} = \theta_0^{Data}$.