3 methods to initialize 3d-hydro from AMPT initial parton distributions :

1. 2d+plateau :

$$\epsilon(\eta_s, x, y) = \epsilon(0, x, y) f(\eta_s)$$

where,

$$f(\eta_s) = exp\left[-0.5\left(\frac{\eta_s - \eta_{flat}/2}{\eta_{fall}}\right)^2 \theta\left(\frac{\eta_s - \eta_{flat}/2}{\eta_{fall}}\right)\right]$$

where we solve the following equation to obtain ϵ,

$$T^{\mu\nu}(0, x, y) u_\nu = \epsilon(0, x, y) u^\mu,$$

$$T^{\mu\nu}(0, x, y) = \sum_i \frac{K}{\tau_0 \Delta\eta_s 2\pi\sigma^2} \frac{p^\mu p^\nu}{p^0} exp\left(-\frac{(x - x_i)^2 + (y - y_i)^2}{2\sigma^2}\right)$$

Example: $-3 < \eta_s < 3$, $\Delta\eta_s = 6.0$, $\sigma = 0.6, K = 1, \eta_{flat} = 4, \eta_{fall} = 0.2$.

2. 3d_method_1 :

$$T^{\mu\nu}(\eta_s, x, y)u_\nu = \epsilon(\eta_s, x, y)u^\mu,$$

$$T^{\mu\nu}(\eta_s, x, y) = \sum_i \frac{K}{\tau_0 \Delta\eta_s 2\pi\sigma^2} \frac{p^\mu p^\nu}{p^0} exp\left(-\frac{(x-x_i)^2 + (y-y_i)^2}{2\sigma^2}\right)$$

Example: $(\eta_s - 0.5) < \eta_s < (\eta_s + 0.5)$, $\Delta\eta_s = 1.0$,$\sigma = 0.6$, $K = 1$.

3. 3d_method_2 :

$$T^{\mu\nu}(\eta_s, x, y)u_\nu = \epsilon(\eta_s, x, y)u^\mu,$$

$$T^{\mu\nu}(\eta_s, x, y) = \sum_i \frac{K}{\tau_0 \sqrt{(2\pi\sigma_{\eta_s}^2)} 2\pi\sigma^2} \frac{p^\mu p^\nu}{p^0}$$

$$exp\left(-\frac{(x-x_i)^2 + (y-y_i)^2}{2\sigma^2} - \frac{(\eta_s - \eta_s^i)^2}{2\sigma_{\eta_s}}\right)$$

Example: $\sigma_{\eta_s} = 0.6$,$\sigma = 0.6$, $K = 1$.