Kalman filter in

$$x_{\text{track}}(z) = z \cdot x_{\text{slope}} + x_0$$
$$y_{\text{track}}(z) = z \cdot y_{\text{slope}} + y_0$$

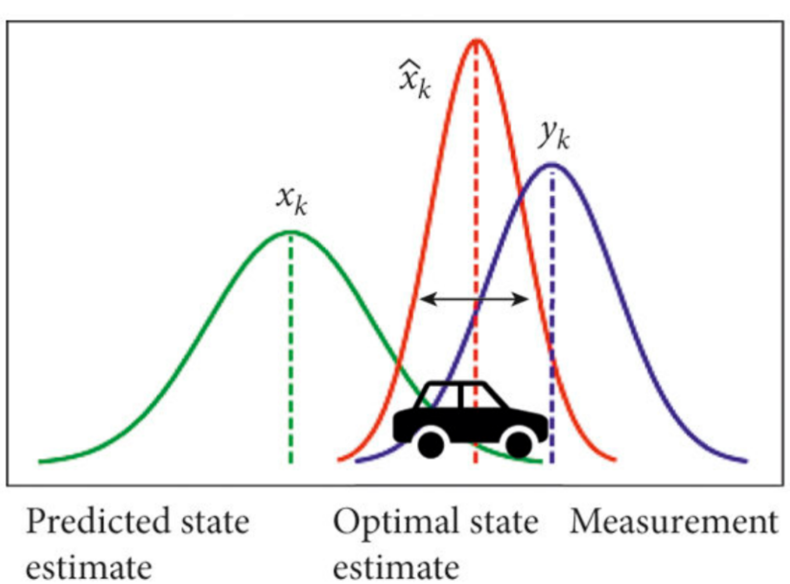
1. Linear Fit: actual reconstruction of tracks and vertices

2. Kalman Filter: Alternative method. For each point

$$X'_i = \begin{pmatrix} x_i \\ y_i \\ x_{\text{slope},i} \\ y_{\text{slope},i} \end{pmatrix}$$

First point as a reference ⇒ position of the second point using the transition matrix:

$$X'(z_2) = A_{1\to 2} X'(z_1) \qquad A_{1\to 2} = \frac{\partial X(z_2)_i}{\partial X(z_1)_j} = \begin{pmatrix} 1 & 0 & \Delta z & 0 \\ 0 & 1 & 0 & \Delta z \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$



$$K = \frac{\textbf{Error}_{\text{Estimated}}}{\textbf{Error}_{\text{Estimated}} + \textbf{Error}_{\text{Measured}}}$$

$$X'_{\text{new}} = X' + K(X_{\text{measured}} - CX')$$