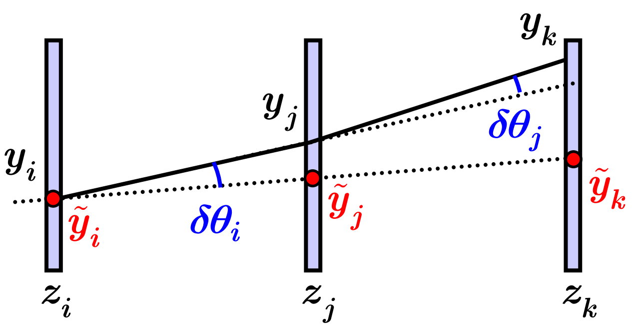
Multiple Scattering

- Multiple scattering is a cumulative effect and introduces correlation among the coordinate measurements
- The treatment of multiple scattering is different for:
  - Discrete detectors
  - Continuous detectors
- Here we consider only the simplest case of discrete and thin detectors
- For continuous detectors see for example [5: Avery 1991]
- Let's consider 3 thin detectors



- A track cross the 3 planes at positions

$$\tilde{y}_i \quad \tilde{y}_j \quad \tilde{y}_k$$

- The 3 coordinate have measurement errors σ_i, σ_j, σ_k due to the detector resolution
- They also have mean value

$$\boxed{\langle \tilde{y}_i \rangle = \bar{\tilde{y}}_i \quad \langle \tilde{y}_j \rangle = \bar{\tilde{y}}_j \quad \langle \tilde{y}_k \rangle = \bar{\tilde{y}}_k}$$

- On plane i $\quad y_i = \tilde{y}_i$
- Because of multiple scattering on plane i the actual trajectory cross plane j at

$$y_j = \tilde{y}_j + (z_j - z_i)\delta\theta_i$$

- Because of multiple scattering on planes i,j the actual trajectory cross plane k at

$$y_k = \tilde{y}_k + (z_k - z_i)\delta\theta_i + (z_k - z_j)\delta\theta_j$$

- Since $\quad \langle \delta\theta \rangle = 0$

$$\bar{y}_i = \bar{\tilde{y}}_i \qquad \bar{y}_j = \bar{\tilde{y}}_j \qquad \bar{y}_k = \bar{\tilde{y}}_k$$