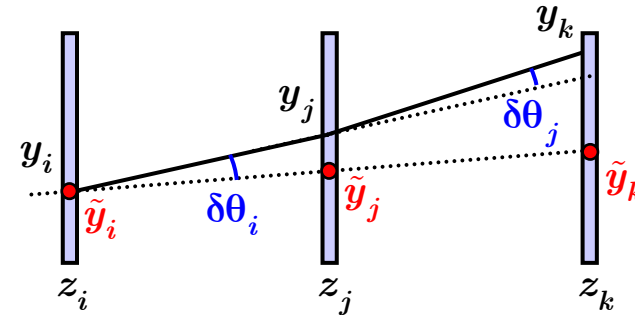


# Multiple Scattering

$$V_{nm} = \langle (y_m - \bar{y}_m)(y_n - \bar{y}_n) \rangle$$

- The off-diagonal elements are



$$V_{ij} = \langle (y_i - \bar{y}_i)(y_j - \bar{y}_j) \rangle = \langle \underbrace{(y_i - \bar{y}_i)}_{\text{red bracket}} \underbrace{(y_j - \bar{y}_j)}_{\text{red bracket}} + \underbrace{(z_j - z_i)\delta\theta_i}_{\text{red bracket}} \rangle \quad V_{ij} = 0$$

$$V_{ik} = \langle (y_i - \bar{y}_i)(y_k - \bar{y}_k) \rangle \quad \text{uncorrelated: } \langle \rangle = 0$$

$$= \langle \underbrace{(y_i - \bar{y}_i)}_{\text{red bracket}} \underbrace{(y_k - \bar{y}_k)}_{\text{red bracket}} + \underbrace{(z_k - z_i)\delta\theta_i}_{\text{red bracket}} + \underbrace{(z_k - z_j)\delta\theta_j}_{\text{red bracket}} \rangle \quad V_{ik} = 0$$

$$V_{jk} = \langle (y_j - \bar{y}_j)(y_k - \bar{y}_k) \rangle \quad \text{uncorrelated: } \langle \rangle = 0$$

$$= \langle (y_j - \bar{y}_j + (z_j - z_i)\delta\theta_i)(y_k - \bar{y}_k + (z_k - z_i)\delta\theta_i + (z_k - z_j)\delta\theta_j) \rangle$$

$$= \langle (z_j - z_i)\delta\theta_i(z_k - z_i)\delta\theta_i \rangle$$

$$V_{jk} = (z_j - z_i)(z_k - z_i)\langle \delta\theta_i^2 \rangle$$