$$\frac{\sigma}{E} = a \oplus \frac{b}{\sqrt{E}} \oplus \frac{c}{E}$$

or $$\sigma^2 = a^2E^2 + b^2E + c^2$$

Consider $E_1 = \alpha E$ and $E_2 = (1-\alpha)E$ so that $E_1 + E_2 = E$

$$\sigma_1^2 = a^2\alpha^2E^2 + b^2\alpha E + c^2$$

$$\sigma_2^2 = a^2(1-\alpha)^2E^2 + b^2(1-\alpha)E + c^2$$

$$\sigma_1^2 + \sigma_2^2 = a^2E^2\left[\alpha^2 + (1-\alpha)^2\right] + b^2E + 2c^2$$

$$\Rightarrow \boxed{\sigma_1^2 + \sigma_2^2 = \sigma^2 - 2\alpha(1-\alpha)a^2E^2 + c^2}$$

- If a is large, one can have situations where

$$\sigma_1^2 + \sigma_2^2 < \sigma^2$$

This would be the case in particular if there are significant $\underbrace{\text{intercalibration}}_{\text{(relative)}}$ errors between crystals.

- Note that if one considers only the statistical term $(a=c=0)$

$$\sigma_1^2 + \sigma_2^2 = \sigma^2$$