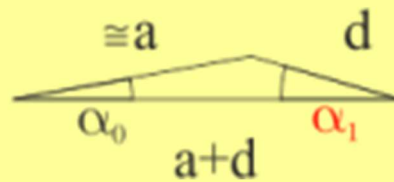
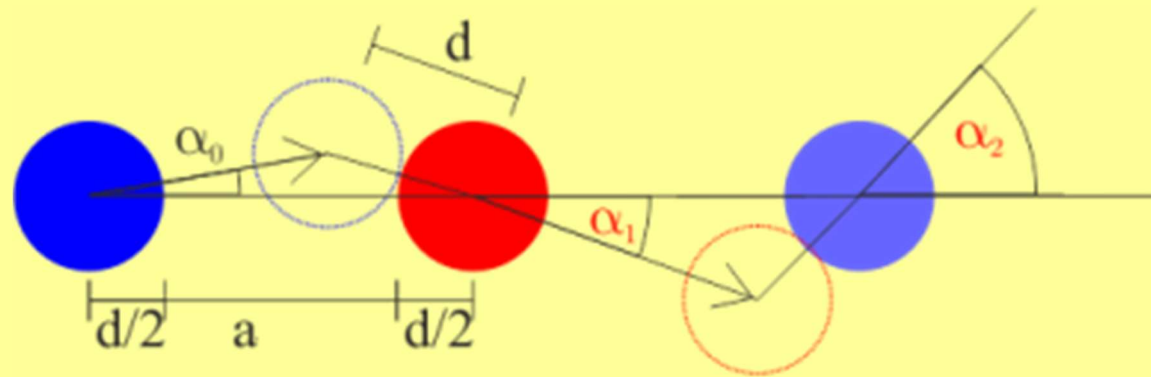


Winkeländerung



kleine Winkel: $\frac{\alpha_1}{\alpha_0} \approx \frac{a}{d}$

1. Stoß:

$$\alpha_1 \approx \alpha_0 \cdot \frac{a}{d}$$

exakt: $\alpha_1 = \arcsin\left(\left[1 + \frac{a}{d}\right] \sin \alpha_0\right) - \alpha_0$

n-ter Stoß:

$$\alpha_n \approx \alpha_0 \cdot \underbrace{\frac{a}{d} \cdot \frac{a}{d} \cdots \frac{a}{d}}_{n\text{-mal}} = \alpha_0 \cdot \left(\frac{a}{d}\right)^n$$

Exponentielles
Wachstum