

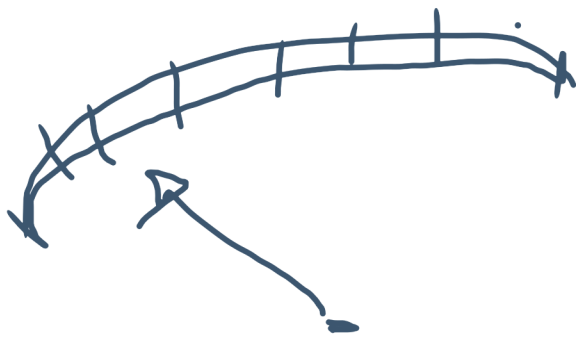
- Link alle due lezioni registrate:
 - https://drive.google.com/open?id=1vj6-aMPNzNliDMSXMERT9fZ_p_J4U2oE
 - <https://drive.google.com/open?id=10T7FptU-DWUpuY5FUqYa6sOQRDsaKgwG>

01/04/2020

$$N = \frac{A}{t} \quad A = e \cdot e$$

ПРОПАГО

$$\Delta P = P - P'$$



$$\delta \cdot 0,1 \quad \checkmark$$

$$\delta, 01 \pm 0,01$$

$$\delta, 010 \pm 0,005$$

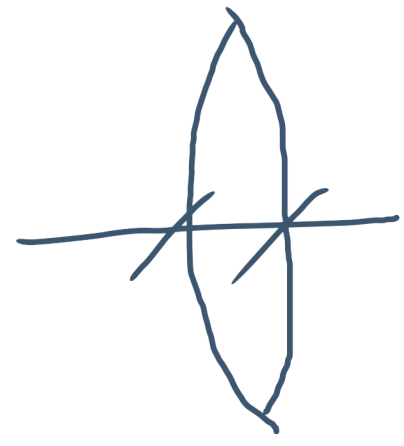
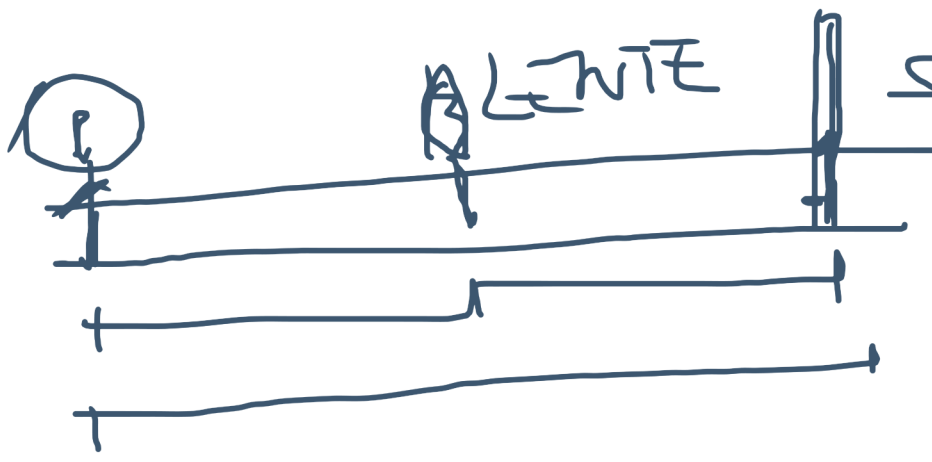
$$\delta \cdot 10 \text{ s}$$

↑

$$\delta, 6 \pm 0,01 \text{ s}$$

=

LAMP. LINSE SCHIRM



n \sqrt{n}

$$q = x + y$$

$$q_b = x_b + y_b$$

$$*(H(x)) = x_b \pm \delta x$$

$$\delta q \approx \delta x + \delta y$$

$$(H(y)) = y_b \pm \delta y$$

$$q = x + y + z + w \dots$$

$$\delta q \approx \delta x + \delta y + \delta z + \delta w \dots$$

$$q = x - y \quad \delta q \approx \delta x + \delta y$$

(4)

$$q = x - y + z - w + \dots$$

$$\delta q \approx \delta x + \delta y + \delta z + \delta w + \dots$$

$$M_1 = 540 \pm 10 \text{ g}$$

$$M_2 = 940 \pm 20 \text{ g}$$

$$m_1 = 12 \pm 1 \text{ g}$$

$$m_2 = 17 \pm 1 \text{ g}$$

$$m = (M_2 - m_2) + (M_1 - m_1) = 1310 \text{ g}$$

6 468 843

$$\delta m \approx 32 \text{ g}$$

$$1310 \pm 30 \text{ g}$$

$$\pm 32 \text{ g}$$

(5)

$$q = x / y$$

$$\begin{aligned} (115 x) &= x_b \pm \delta x \\ (115 y) &= y_b \pm \delta y \end{aligned}$$

(6)

$$q_b = x_b / y_b$$

$$(115 q) = \frac{x_b \pm \delta x}{y_b \pm \delta y}$$

$$\frac{x_b \left(1 \pm \frac{\delta x}{x_b}\right)}{y_b \left(1 \pm \frac{\delta y}{y_b}\right)}$$

ALTO VAL q

$$x_b \left(1 \pm \frac{\delta x}{x_b}\right)$$

$$\frac{1 \pm \frac{\delta x}{x_b}}{1 \pm \frac{\delta y}{y_b}}$$

q ≈

$$q_b \left(1 \pm \frac{\delta x}{x_b}\right)$$

$$\frac{1+a}{1+b}$$

a, b piccolo:

(7)

$$\frac{1}{1+b} \approx 1+b$$

$$\frac{1}{1-0.1} = \frac{1}{0.9} = 1.11$$

$$\frac{(1+a)}{1-b} \approx (1+a)(1+b) = 1+a+b+\cancel{ab}$$

$$a, b \approx 0,1$$

$$a \cdot b = 0,1 \cdot 0,1$$

$$1+0,1+0,1+0,01$$

$$\frac{1+a}{1-b} \approx 1+a+b$$

$$= 1.2$$

VAL ALTO q :

$$q_b (1 + a + b)$$

VAL BASSO q :

$$q_b \frac{1 - a}{1 + b} =$$

$$\frac{1 - a}{1 + b} \sim (1 - a)(1 - b) \sim$$
$$\sim 1 - a - b + \cancel{ab}$$

$$\approx q_b (1 - (a + b))$$

$$q_b \cdot \left[\frac{\delta x}{|x_b|} + \frac{\delta y}{|y_b|} \right] \approx \delta q$$

$$(a) \quad a = \frac{\delta x}{|x_b|}$$

$$b = \frac{\delta y}{|y_b|}$$

$$q_{ALTO} - q_b = q_b \left(\frac{\delta x_b}{|x_b|} + \frac{\delta y_b}{|y_b|} \right) \quad (9)$$

$$q_b - q_{BASS} = \dots$$

ALTO
 $q_b + \delta q$
 BASS
 $q_b - \delta q$

$$q_b \left(1 + \left(\frac{\delta x_b}{|x_b|} + \frac{\delta y_b}{|y_b|} \right) \right)$$

$$q_b \left(1 - \left[\frac{\delta x_b}{|x_b|} + \frac{\delta y_b}{|y_b|} \right] \right)$$

$$\delta q = q_b \left(\frac{\delta x}{|x_b|} + \frac{\delta \phi}{|\phi_b|} \right)$$

$$\frac{\delta q}{q_b} = \frac{\delta x}{|x_b|} + \frac{\delta \phi}{|\phi_b|}$$

1

(=)

$$p = x + y + z + \dots$$

$$p^2 = x^2 + y^2 + z^2 + \dots$$

$$p = \frac{x}{y} + \frac{z}{y} + \dots$$

$$p = x \cdot y$$

$$p = \frac{x}{y} + \frac{z}{y} + \dots$$

~~$$p = x + z + \dots$$~~

$$q = B \cdot x \quad \delta q = B \cdot \delta x$$

(12)

$$\frac{\delta q}{|q_b|} = \frac{\delta x}{|x_b|} + \frac{\cancel{\delta B}}{\cancel{B}}$$

$$\delta q = \frac{\delta x}{|x_b|} \cdot |q_b| = \frac{\delta x \cdot |B| \cdot \cancel{|x_b|}}{\cancel{|x_b|} \cdot |B|} = |B| \delta x$$

$$\begin{aligned}
 & q = x^2 = x \cdot x & q_b = x_b^{\textcircled{2}} & \quad (3) \\
 & \frac{\delta q}{\delta x_b} = \frac{\delta}{\delta x_b} (x \cdot x) & & \\
 & = \frac{\delta x}{\delta x_b} \cdot x + x \cdot \frac{\delta x}{\delta x_b} & & \\
 & = \frac{\delta x}{\delta x_b} \cdot 2x & &
 \end{aligned}$$

$$\delta q = 2 \frac{\delta x}{\delta x_b} \cdot x_b = 2 \frac{\delta x}{\delta x_b} \cdot |x_b| \quad \text{with a star symbol}$$

$$\delta q = 2 \delta x |x_b|$$

$$\frac{\|q\|_2}{\|b\|_2} \approx 2$$

$$\frac{\|f(x)\|_2}{\|b\|_2}$$

$$q = x^2$$

$$(\text{HLS } x) = x_b \pm \delta x \quad (14)$$

$$\textcircled{1} \quad \overset{3.3}{(5 \pm 1)^x} + \overset{2}{(8 \pm 2)^y} - \overset{2}{(10 \pm 4)^z} \quad (15)$$

$$q_b = x_b + y_b - z_b \Rightarrow \textcircled{3}$$

$$\delta q_b^2 = 4 \quad \textcircled{3 \pm 7}$$

$$\delta q_b^* = \sqrt{1+4+16} = \sqrt{21} = 4,58$$

$$\textcircled{2} \quad (5 \pm 1) \times (8 \pm 2) \quad q_b = 40$$

$$\frac{\delta q}{q_b} = \frac{\delta x}{x_b} + \frac{\delta y}{y_b} = \frac{1}{5} + \frac{2}{8} = 0,2 + 0,25 = 0,45$$

$$\delta q = 0,45 \times 40 = \textcircled{18} \quad (q_b) = 40 \pm \cancel{18}^{\pm 13}$$

$$\delta q/q_b^* = \sqrt{\frac{1}{25} + \frac{1}{16}} = \sqrt{0,04 + 0,06} = \sqrt{0,1} = 0,32$$