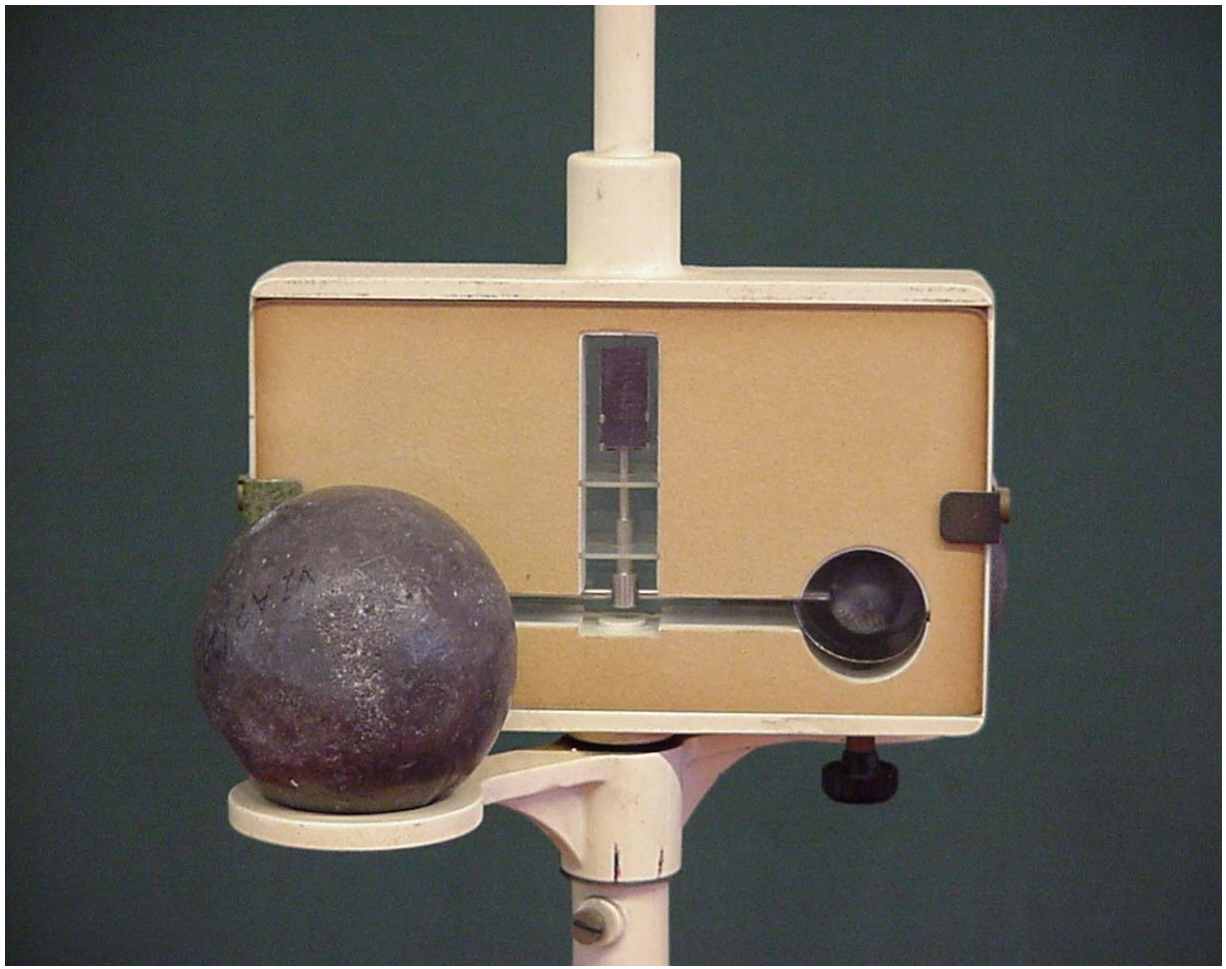
Gravitationswaage

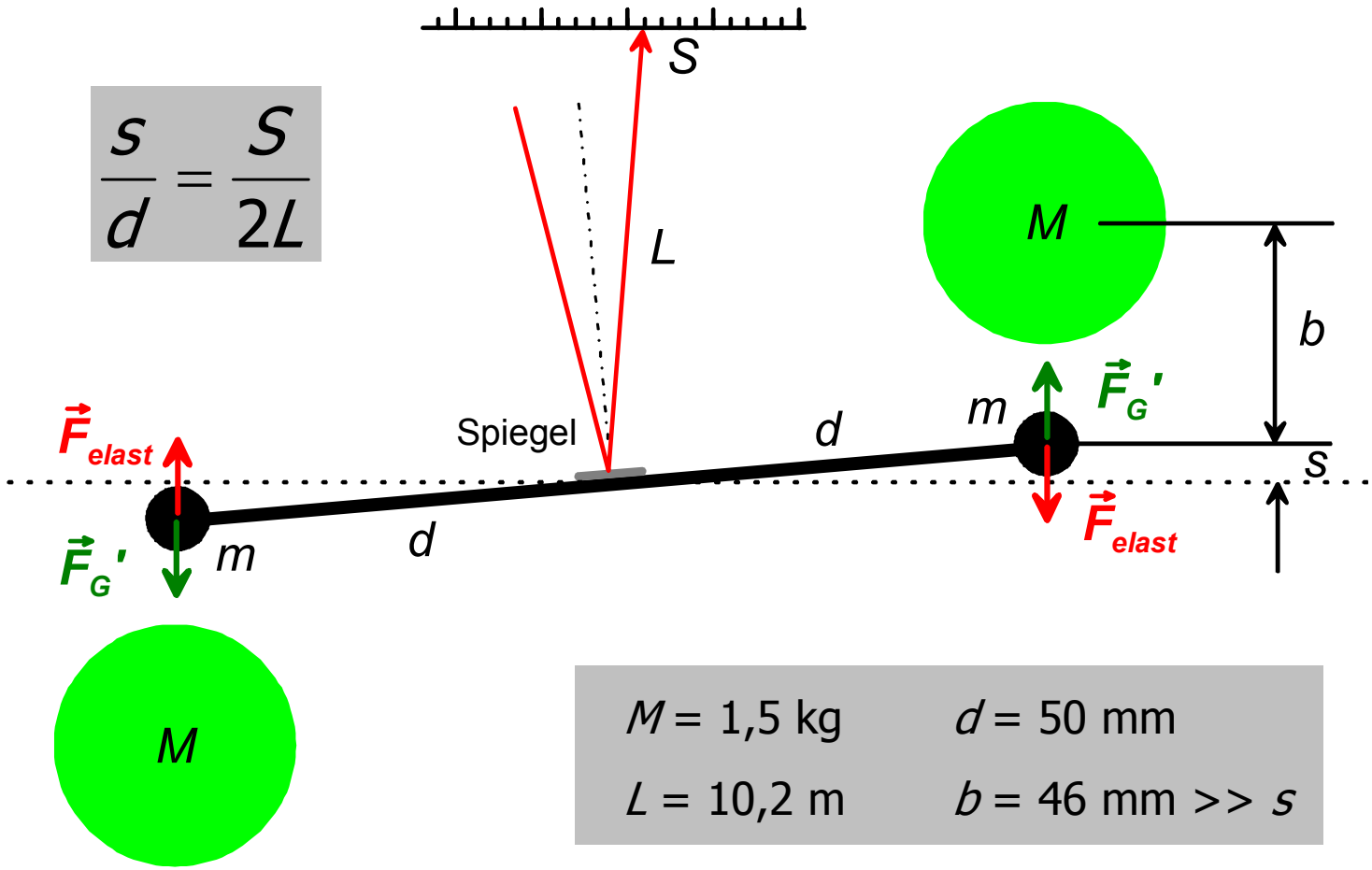
Bestimmung der Gravitations-konstante nach Cavendish

Gravitationswaage



Ausgangsstellung

$$\frac{s}{d} = \frac{S}{2L}$$



M = 1,5 kg	d = 50 mm
L = 10,2 m	b = 46 mm >> s

Nach dem Wenden der Massen

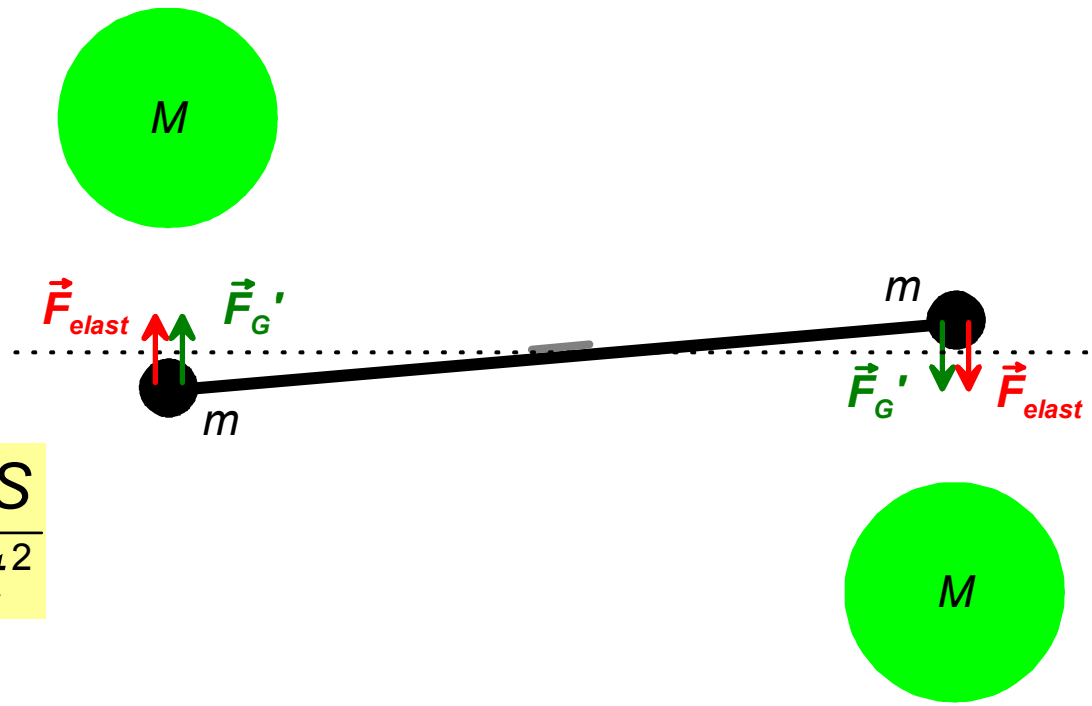
$$ma = F_{elast} + F_G' = 2F_G' = 2\gamma' \frac{Mm}{b^2}$$

$$s = \tfrac{1}{2} a t^2$$

$$a = \frac{dS}{Lt^2}$$

$$\gamma' = \frac{b^2 d}{2ML} \cdot \frac{S}{t^2}$$

$$\gamma' = 3{,}46 \cdot 10^{-6} \frac{\mathrm{m}^2}{\mathrm{kg}} \cdot \frac{S}{t^2}$$

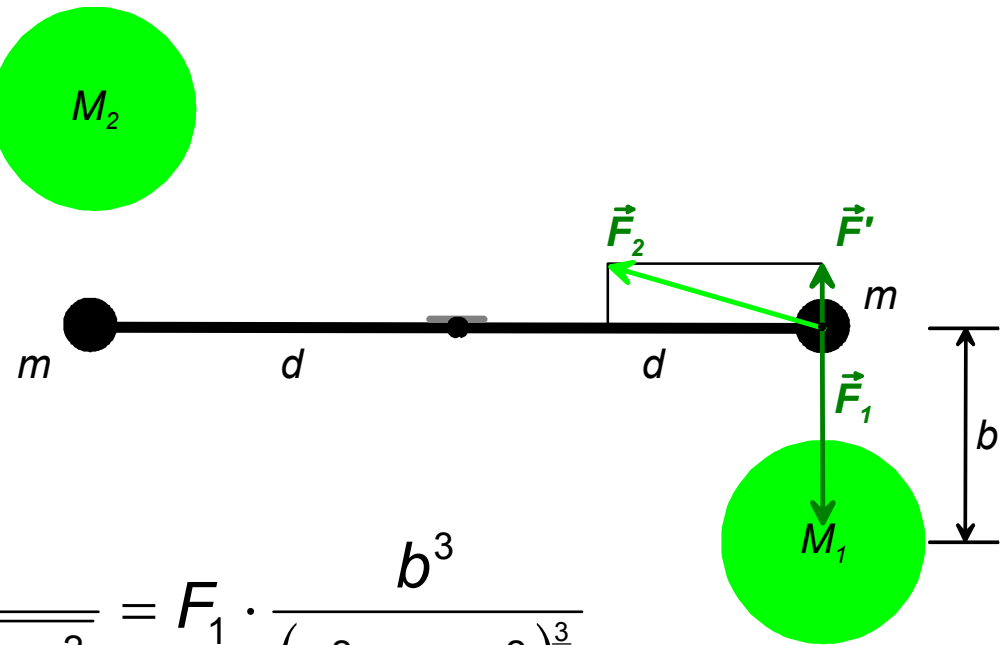


Korrektur

$$F_G' = F_1 - F'$$

$$F_G' = \gamma' \frac{Mm}{b^2}$$

$$F_1 = \gamma \frac{Mm}{b^2}$$



$$F' = \gamma \frac{Mm}{b^2 + 4d^2} \cdot \frac{b}{\sqrt{b^2 + 4d^2}} = F_1 \cdot \frac{b^3}{\left(b^2 + 4d^2\right)^{\frac{3}{2}}}$$

$$\gamma = \gamma' \cdot \frac{1}{1 - \beta}$$

mit $\beta = \dfrac{b^3}{\left(b^2 + 4d^2\right)^{\frac{3}{2}}} = 0{,}073$