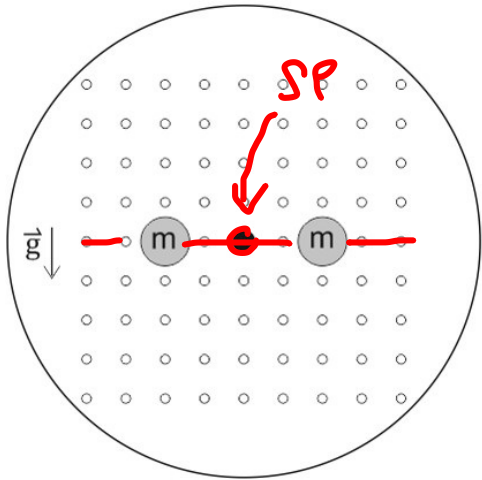


Physics hour 06

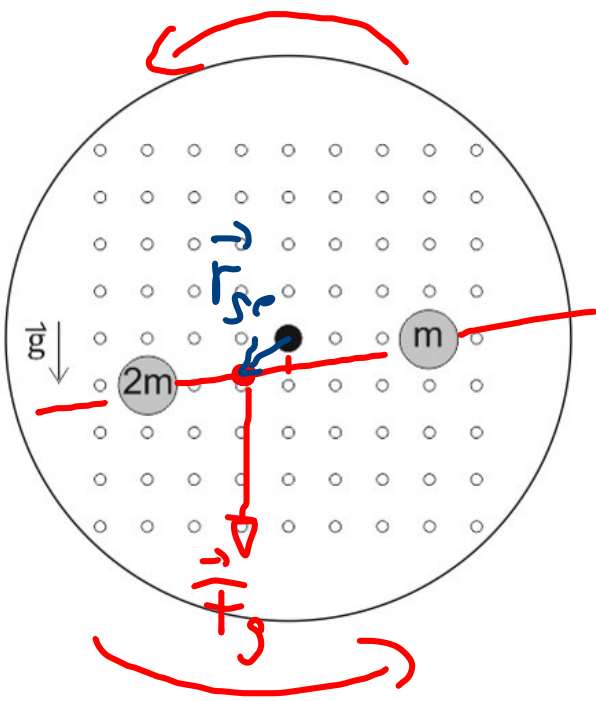
1) Drehscheibe 1



$$\vec{M} = \underbrace{\vec{r}_{sp}}_{=0} \times \vec{F} = 0$$

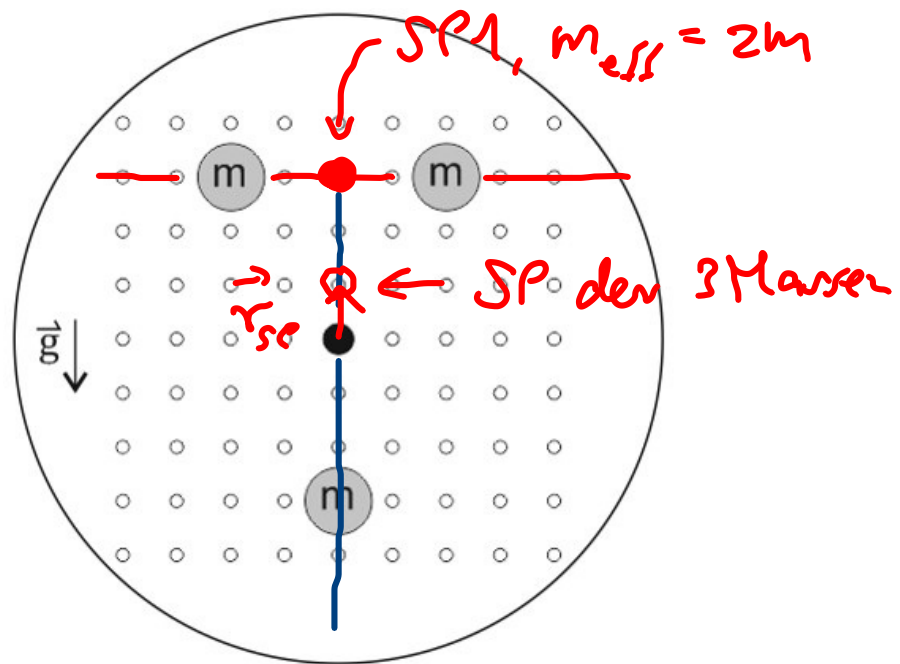
Indifferent Gleichgewicht?

2) Drehscheibe 2



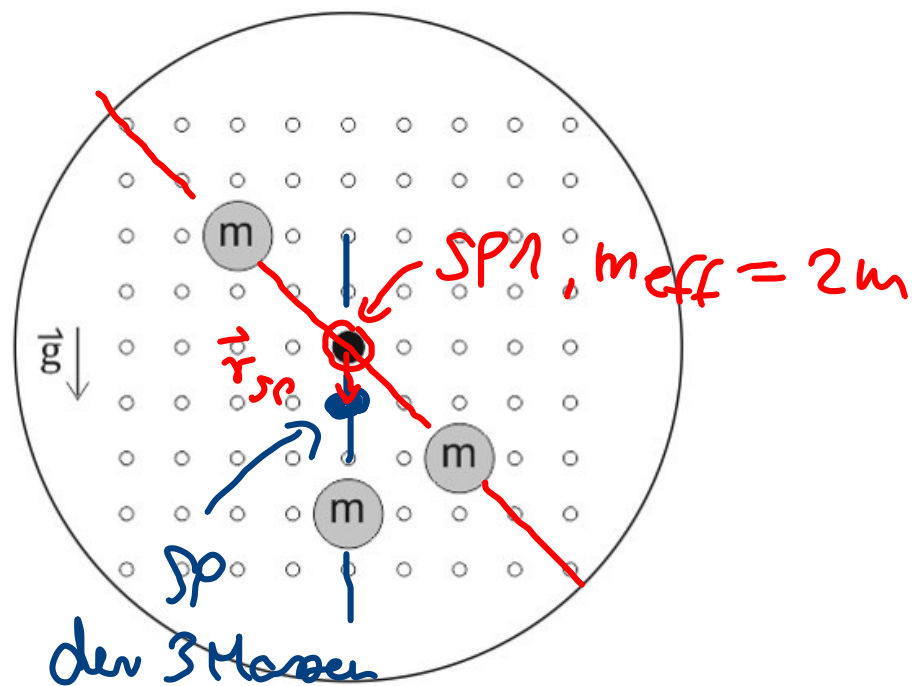
Drehmoment mit Drehung im Gegenuhrzeigersinn

3) Drehscheibe 3



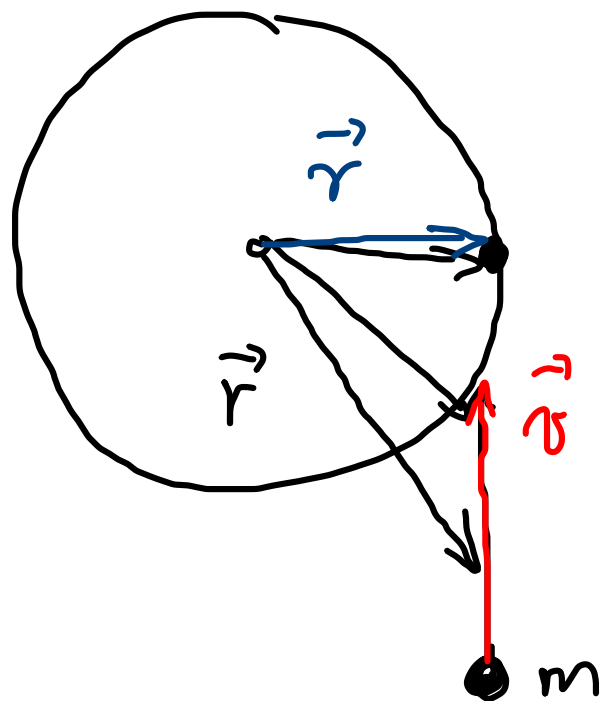
Labiles Gleichgewicht?

4) Drehscheibe 4



Stabiles Gleichgewicht?

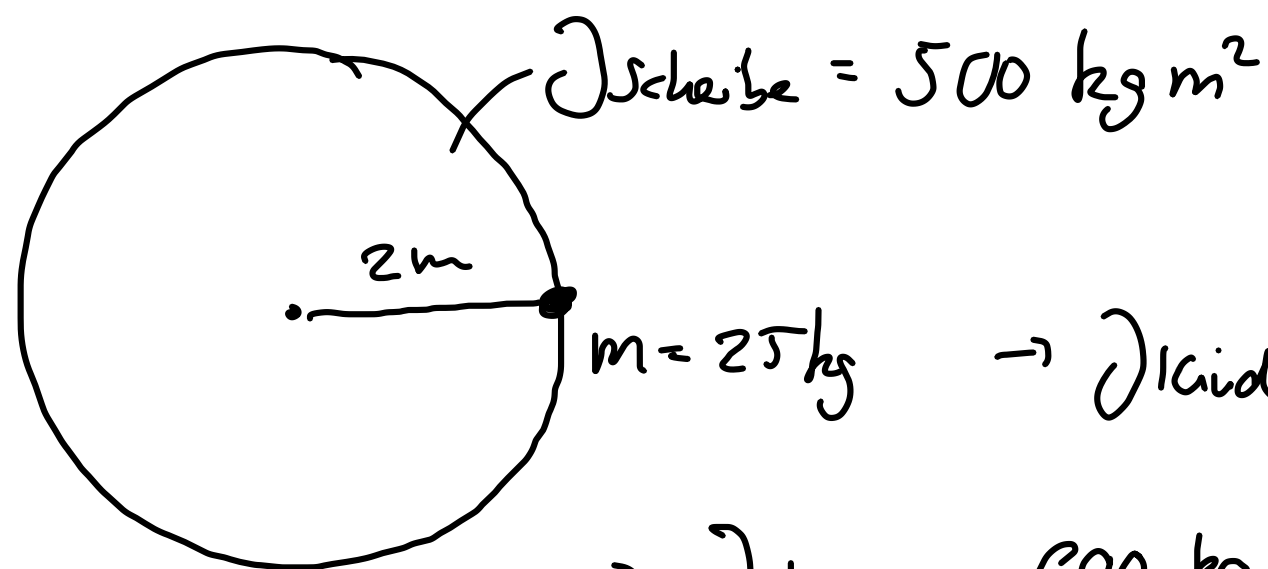
5) Drehimpuls



$$\vec{L} = \vec{r} \times m \cdot \vec{v}$$

$$|\vec{L}| = r \cdot m \cdot v = 2\text{ m} \cdot 25\text{ kg} \cdot 2,5 \frac{\text{m}}{\text{s}} = 125 \text{ kg} \frac{\text{m}^2}{\text{s}}$$

6) Trägheitsmoment



$$m = 25\text{ kg} \rightarrow J_{\text{Gird}} = m \cdot r^2 = 25\text{ kg} \cdot 4\text{ m}^2 = 100 \text{ kg m}^2$$

$$\rightarrow J_{\text{tot}} = 600 \text{ kg} \cdot \text{m}^2$$

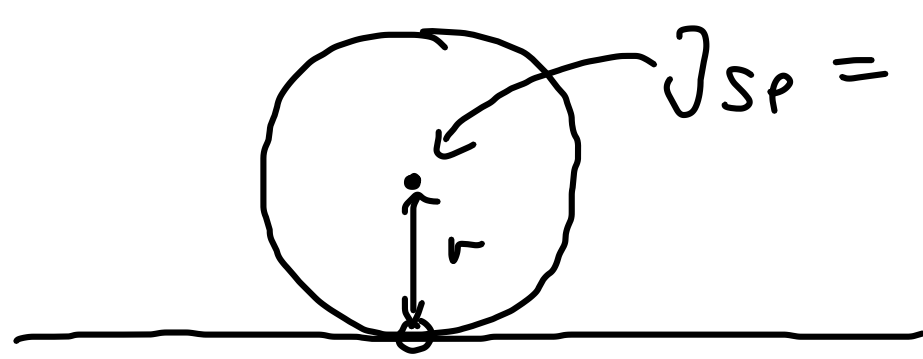
7) Drehimpulserhaltung

$$\vec{L} = J \cdot \vec{\omega} \Rightarrow \omega = \frac{L}{J} = \frac{125 \text{ kg} \frac{\text{m}^2}{\text{s}}}{600 \text{ kg} \frac{\text{m}^2}{\text{s}}} = 0,208 / \text{s}$$

8) Drehimpulssatz

$$M = J \cdot \dot{\omega} = J \cdot \frac{d\omega}{dt} = J \cdot \frac{\Delta\omega}{\Delta t} \Rightarrow 1N = 1kg \frac{m}{s^2}$$
$$\Rightarrow \Delta\omega = \frac{M}{J} \cdot \Delta t = \frac{0,015 Nm}{2 \cdot 10^{-2} kg \cdot m^2} \cdot 1s = 0,75 /s$$

9) Rollende Kugel - Satz von Steiner



$J_{Sp} = \frac{2}{5} m r^2$

$$J_A = J_{Sp} + m r^2 = \frac{2}{5} m r^2 + \frac{5}{5} m r^2 = \frac{7}{5} m r^2$$

$$= J_A = \frac{7}{5} \cdot 1kg \cdot (0,05m)^2 = 35 \cdot 10^{-4} kg m^2$$

10) Rollende Kugel - Rotationsenergie

$$E_{rot} = \frac{1}{2} J \omega^2 = \frac{1}{2} 35 \cdot 10^{-4} kg m^2 \cdot 4/s^2 = 7 mJ$$