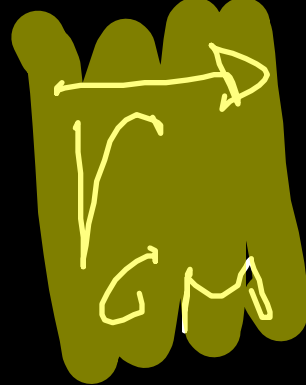
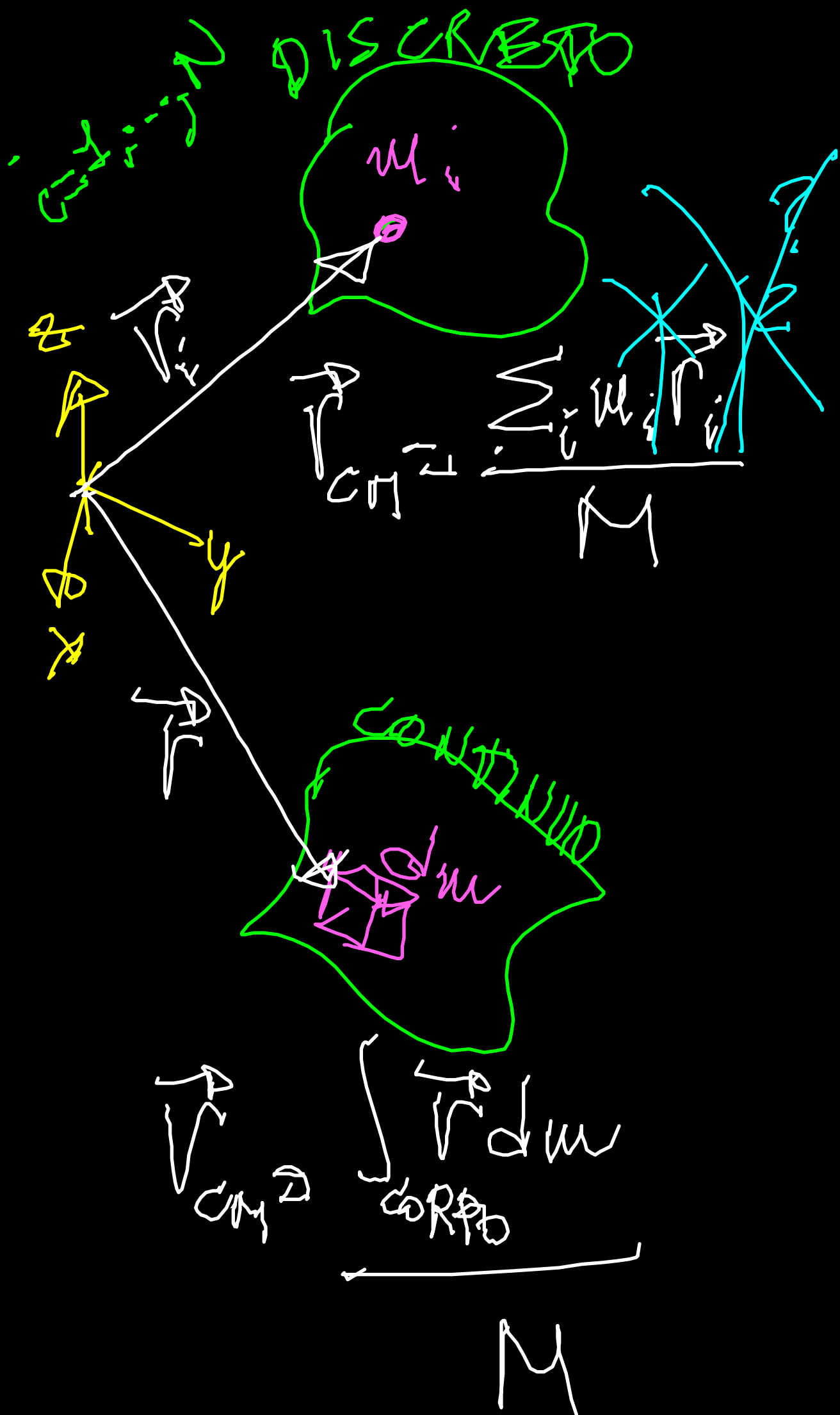


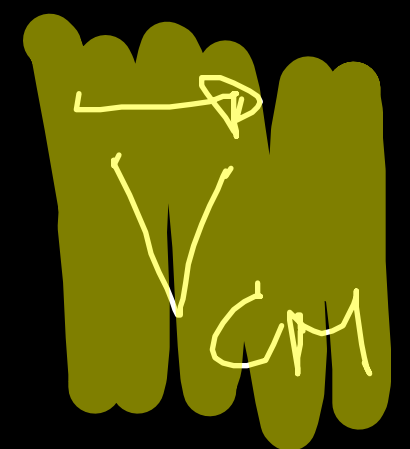
CENTRO DI MASSA →

MOTIO



$$\sum_{i=1}^N m_i \vec{v}_i(t)$$

$$M = \sum_{i=1}^N m_i$$



$$\frac{d}{dt} \vec{v}_{CM}$$

$$\frac{d}{dt} \left(\frac{\sum_{i=1}^N m_i \vec{v}_i(t)}{M} \right) =$$

$$\frac{1}{M} \sum_{i=1}^N \frac{d}{dt} (m_i \vec{v}_i(t))$$

$$\frac{d}{dt} (m_i \vec{v}_i(t)) =$$

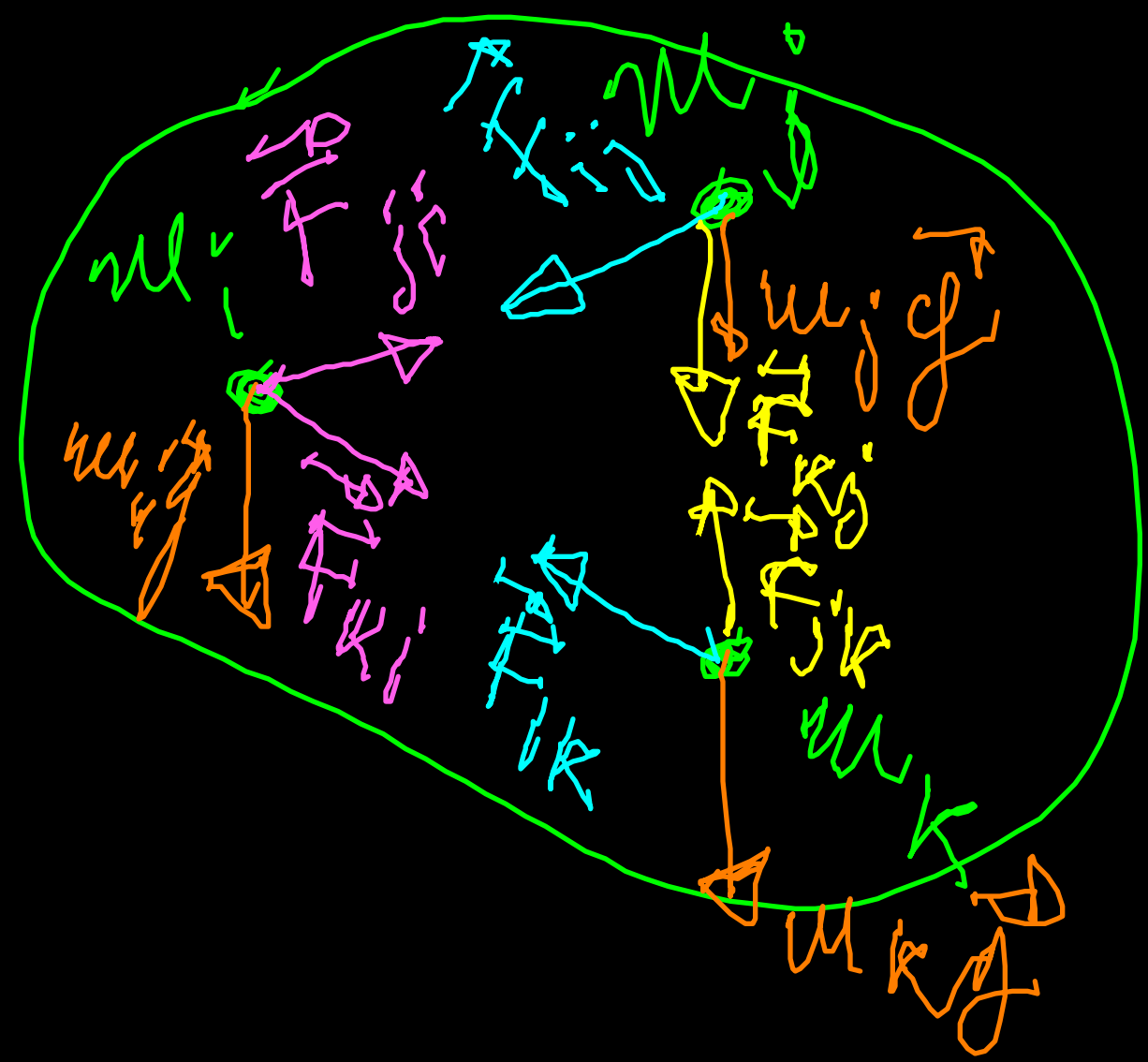
$$\frac{1}{M} \sum_{i=1}^N m_i \vec{v}_i = \vec{V}_{CM}$$

$$\vec{V}_{CM} = \frac{1}{M} \sum_{i=1}^N m_i \vec{V}_i(t)$$

$$\vec{Q}_{CM} = \frac{d}{dt} \vec{V}_{CM}(t) = \frac{d}{dt} \left[\frac{1}{M} \sum_{i=1}^N m_i \vec{V}_i(t) \right] =$$

$$= \frac{1}{M} \sum_{i=1}^N \frac{d}{dt} [m_i \vec{V}_i(t)] = \frac{1}{M} \sum_{i=1}^N m_i \frac{d\vec{V}_i}{dt} = \frac{1}{M} \sum_{i=1}^N m_i \vec{Q}_i = \vec{Q}_{CM}$$

forza



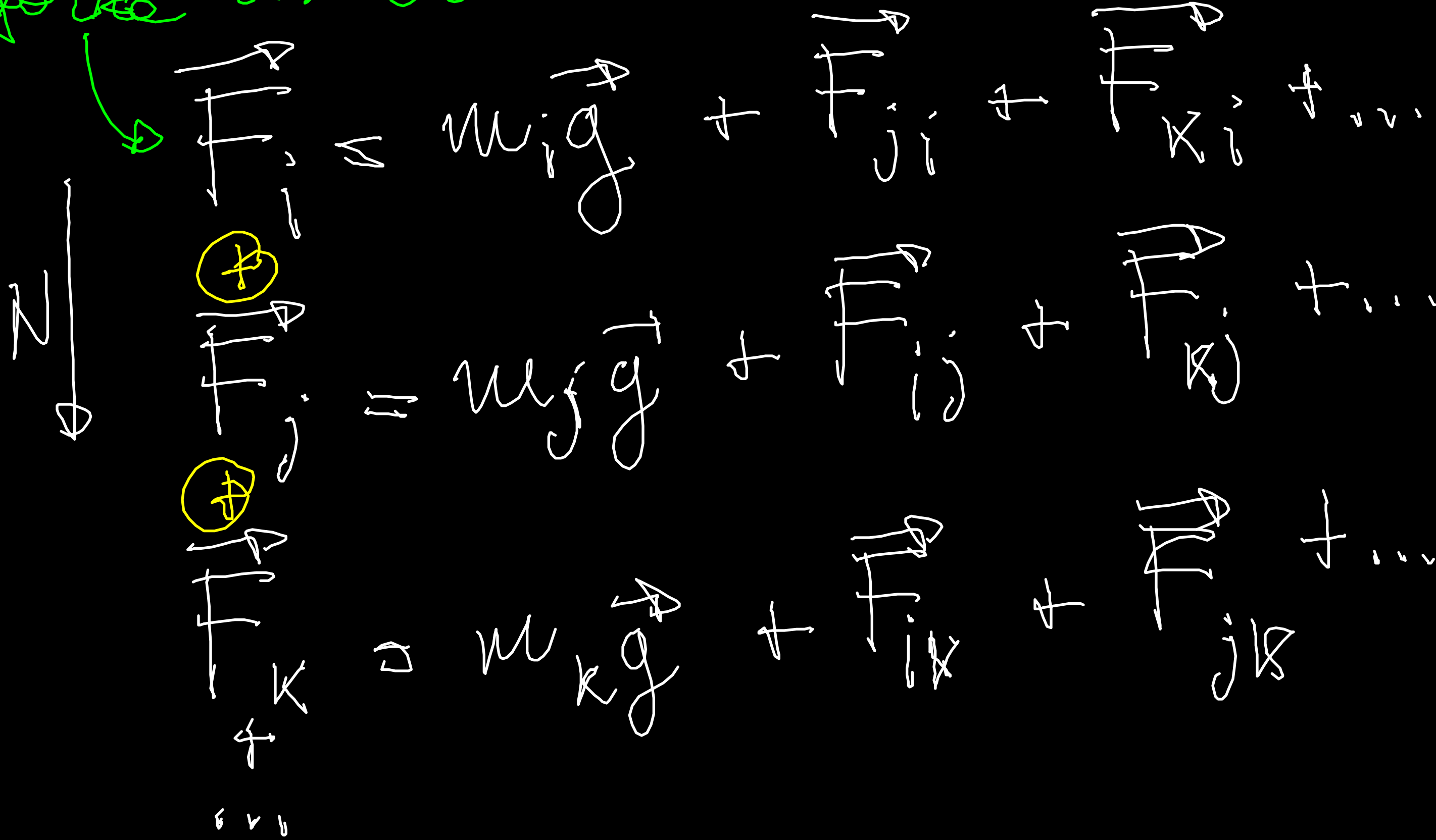
$$m_i \vec{Q}_i = \vec{F}_i$$

$$\vec{F}_i = m_i \vec{g} + \vec{F}_{j \rightarrow i} + \vec{F}_{K \rightarrow i}$$

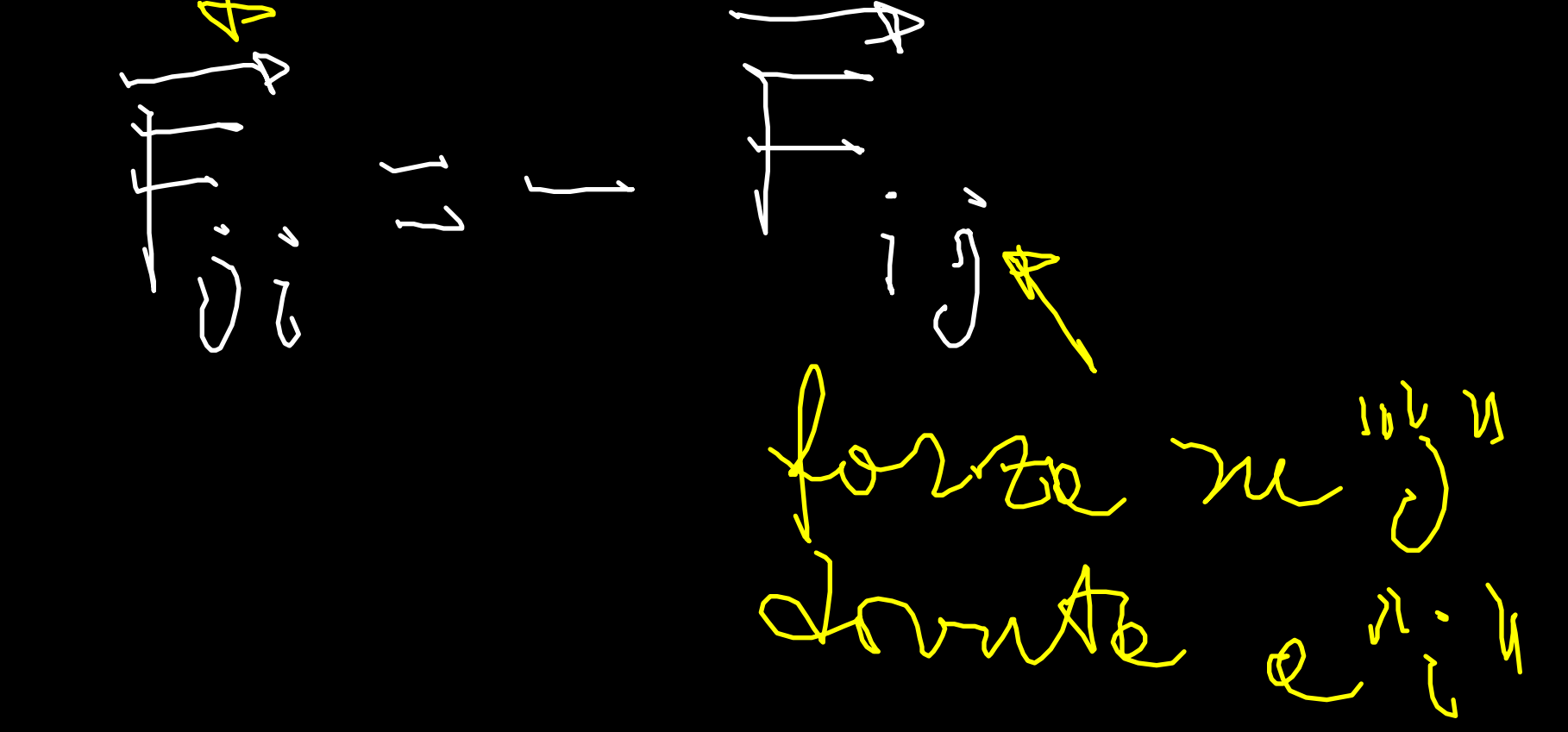
forza risultante
sull' i-esimo
corpuscolo dovuto a:

- altri corpuscoli del corpo stesso
- altri corpi

força resultante em i

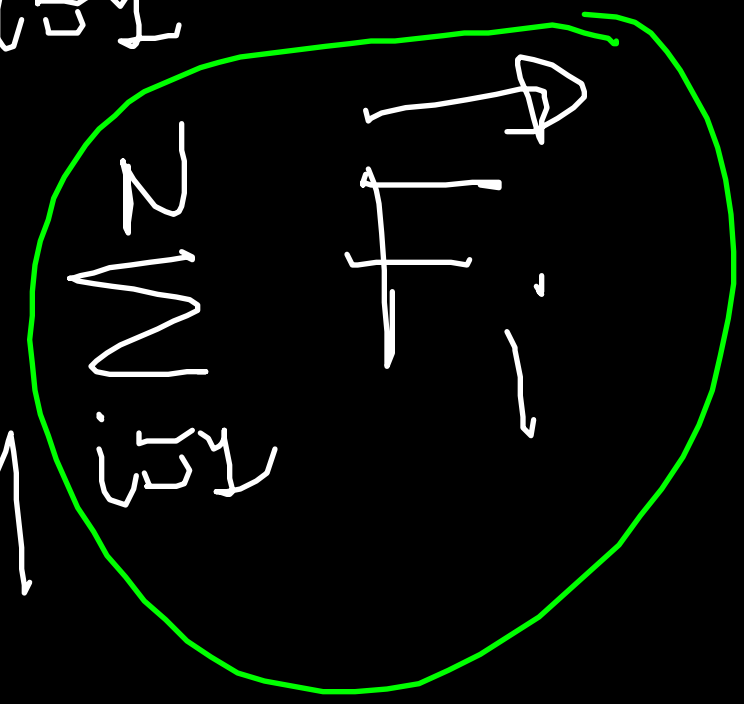


força em i devido a j



$$\vec{Q}_{CM} = \frac{1}{M} \sum_{i=1}^N m_i \vec{q}_i$$

$$\vec{F}_i + \vec{F}_j + \vec{F}_k + \dots = \left(m_i \vec{g} + m_j \vec{g} + m_k \vec{g} + \dots \right) + \vec{F}_{ji} + \vec{F}_{ki} + \dots + \vec{F}_{ij} + \vec{F}_{kj} + \dots$$



$$\sum_{i=1}^n w_i \vec{e}_i = (w_1 \vec{g} + w_2 \vec{g} + w_k \vec{g} + \dots) \quad \vec{g} \quad \vec{F}_{i1} = -\vec{F}_{i2} \quad \text{III P.}$$

$$\sum_{i=1}^n \vec{F}_{ij} + \vec{F}_{ji} + \vec{F}_{ki} + \dots + \cancel{\vec{F}_{ij}} + \cancel{\vec{F}_{jk}} + \dots + \vec{F}_{ik} + \vec{F}_{ki} + \dots = \sum_{i=1}^n w_i \vec{g} = \sum_{i=1}^n w_j \vec{e}_i$$

Somme = 0 Somme = 0 Somme = 0

$$\vec{Q}_{CM} = \frac{1}{M} \sum_{i=1}^N (w_i \vec{e}_i) = \frac{1}{M} \left[\sum_{i=1}^N \left(\vec{F}_{ext,i} + \cancel{\sum_{j \neq i} \vec{F}_{ji}} \right) \right] = \frac{1}{M} \sum_{i=1}^N \vec{F}_{ext,i}$$

EST INT. Per III P.N.

