

Esempi moti circ. unif

- 1) Rotazione Terra attorno suo asse
- 2) Rivoluzione " " Sole
- 3) " " pianeti " "
- 4) Modello atomico Bohr
- 5) lancette orologio analogico

Es. 4.6

Curva

90°

50 Km/h

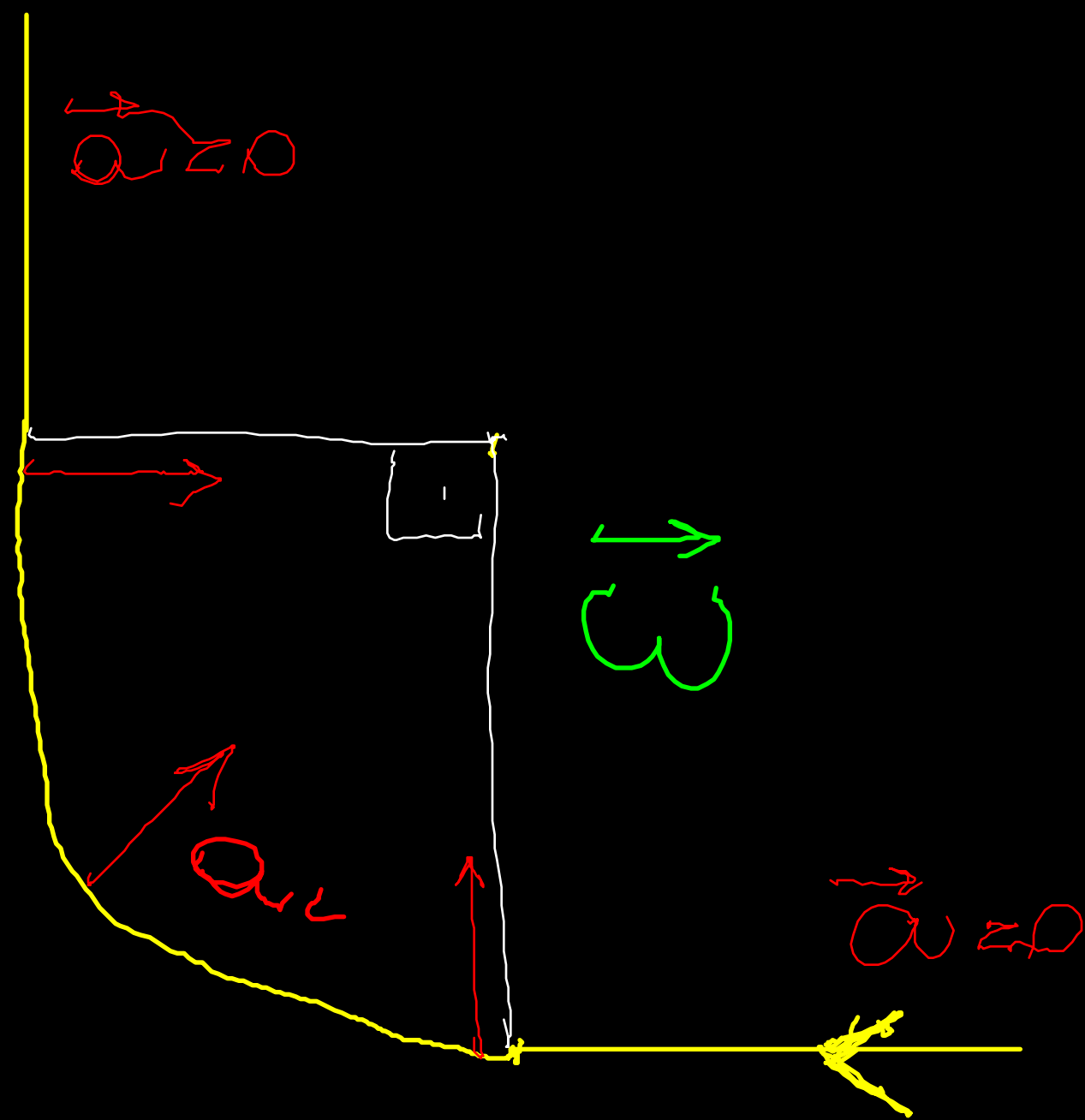
$\left\{ \begin{array}{l} a_c = ? \\ \omega = ? \end{array} \right.$

$R = 22 \text{ m}$

$$v = 50 \cdot \frac{1000 \text{ m}}{3600 \text{ s}} = 13.9 \frac{\text{m}}{\text{s}}$$

$$a_c = \frac{v^2}{R} = 8.77 \frac{\text{m}}{\text{s}^2} = 8.8 \frac{\text{m}}{\text{s}^2}$$

$$\omega = \frac{v}{R} = 0.632 \text{ s}^{-1} = 0.63 \text{ s}^{-1}$$



Par. 4.5

$$\vec{v} = v \hat{t}$$

\hat{t} vettore tang.
- alla traiettoria

$$v = v(t) \quad \hat{t} = \hat{t}(t)$$

- verso del moto

$$\vec{a} = \frac{d\vec{v}}{dt} = \frac{dv}{dt} \hat{t} + v \frac{d\hat{t}}{dt}$$

$\underbrace{\hspace{10em}}_{\rho} \hat{m}$

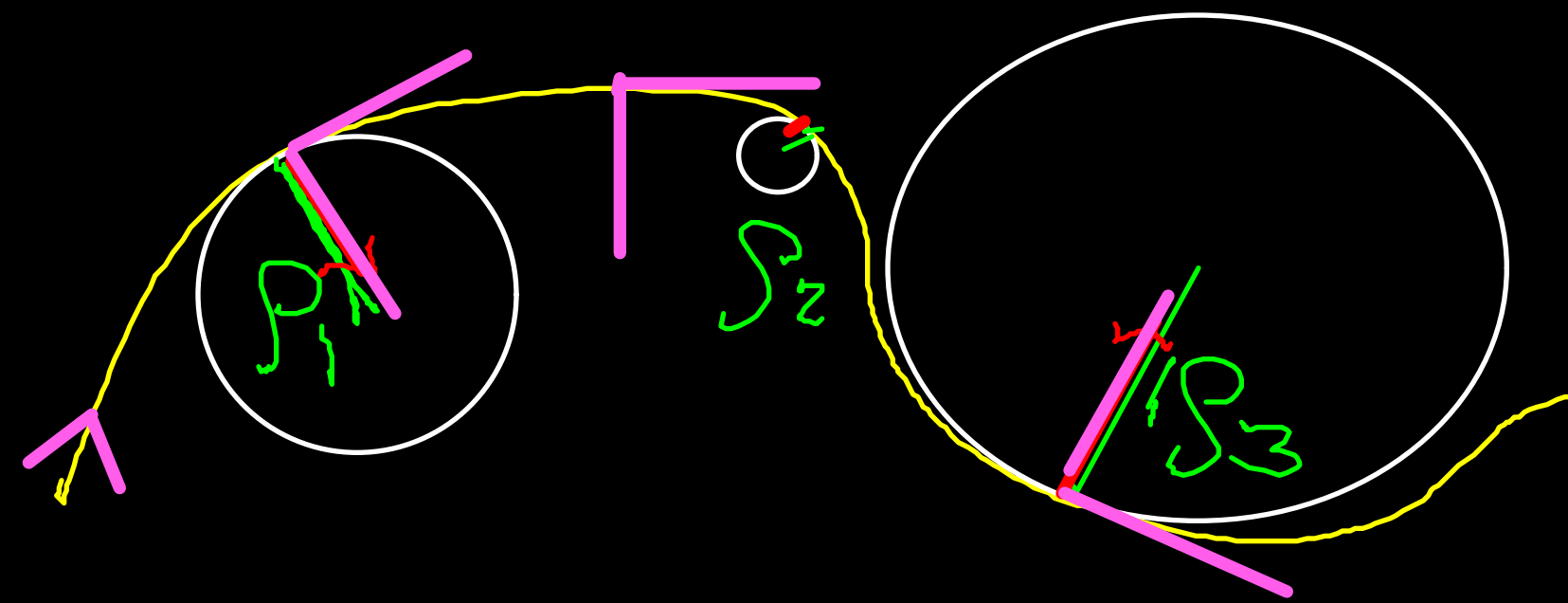
$$\hat{m} \perp \hat{t}$$

piano

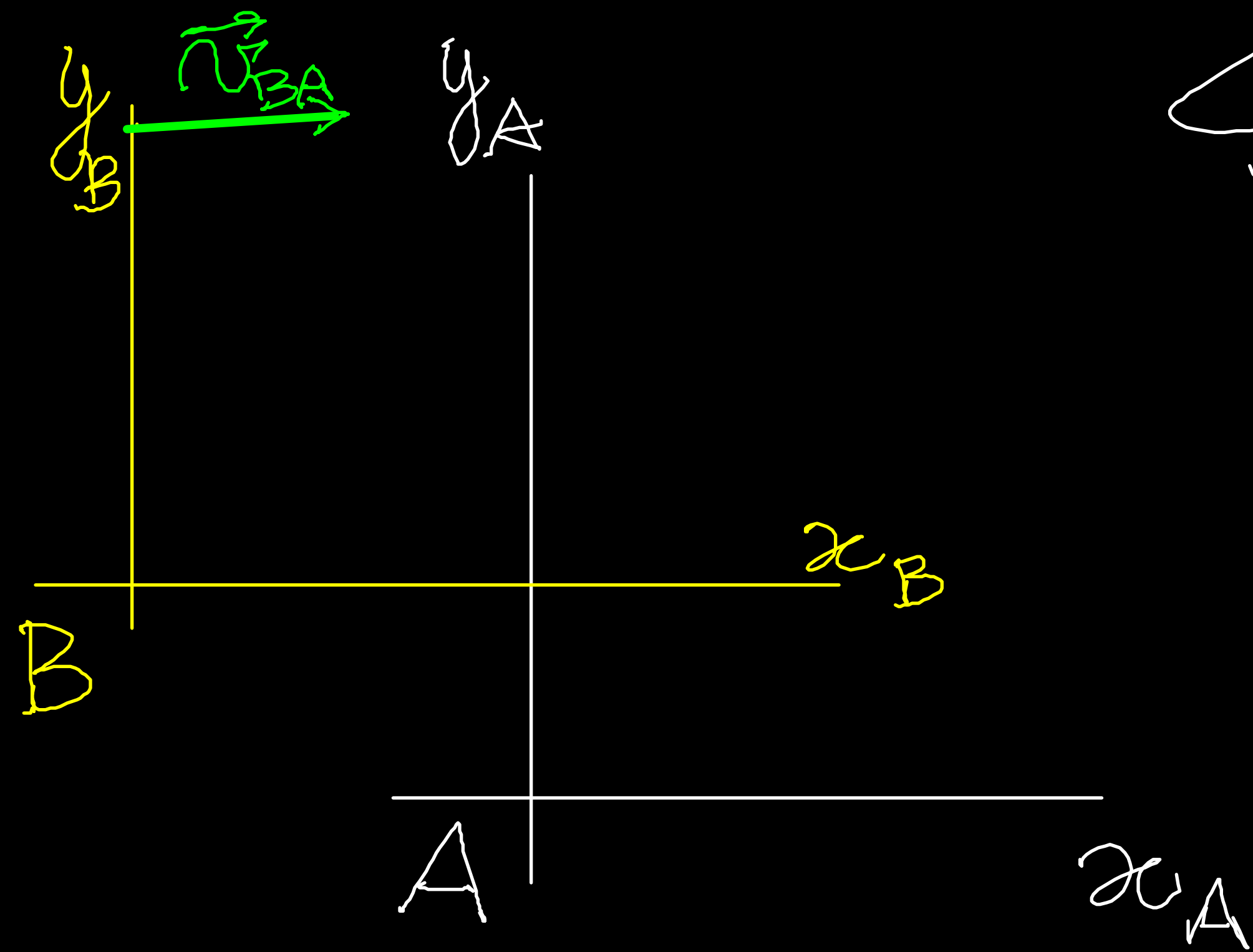
oscurato

$$\vec{a} = \frac{dv}{dt} \hat{t} + \frac{v^2}{\rho} \hat{m}$$

$$a = |\vec{a}| = \sqrt{\left(\frac{dv}{dt}\right)^2 + \frac{v^4}{r^2}}$$

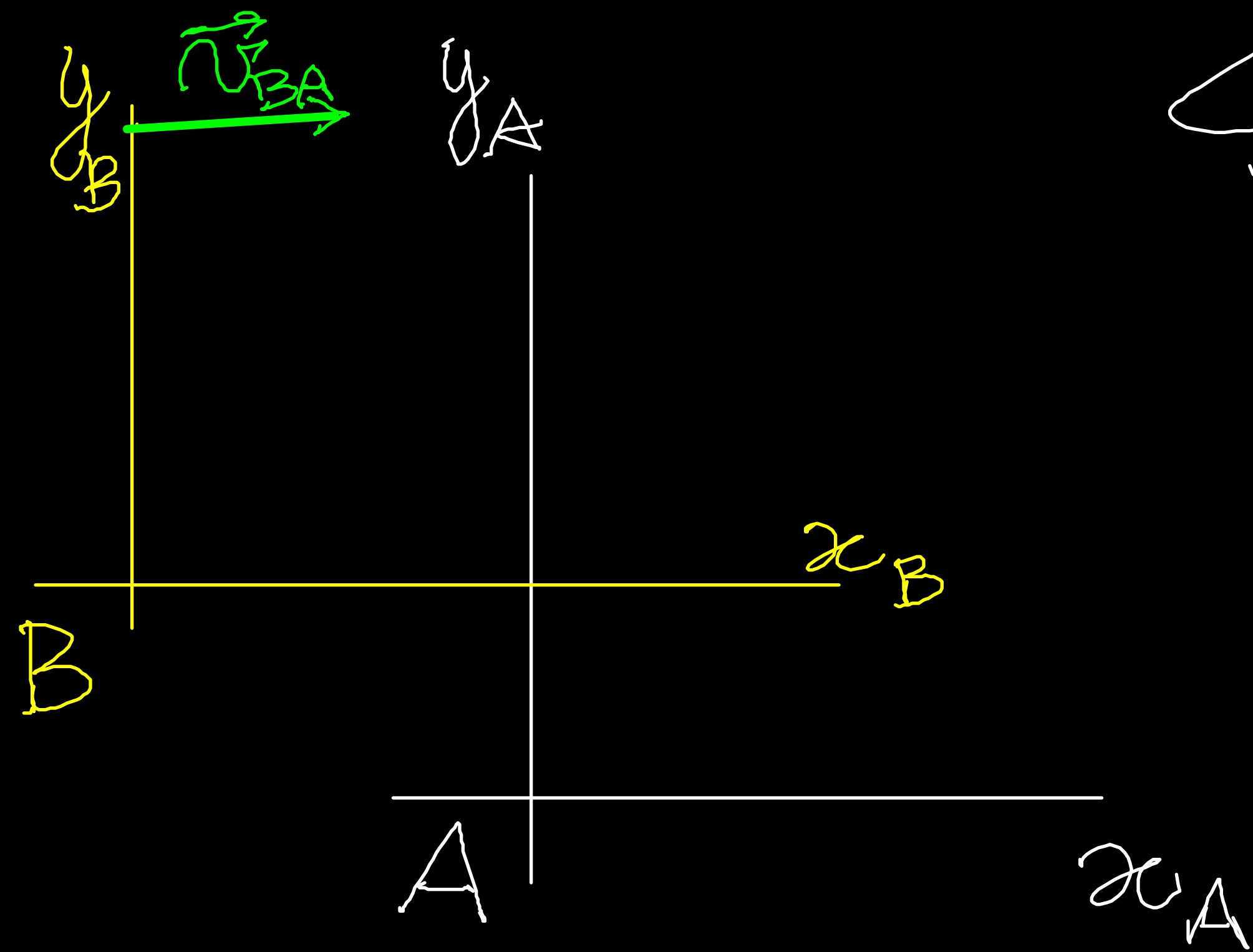


4.7 Moti relativi



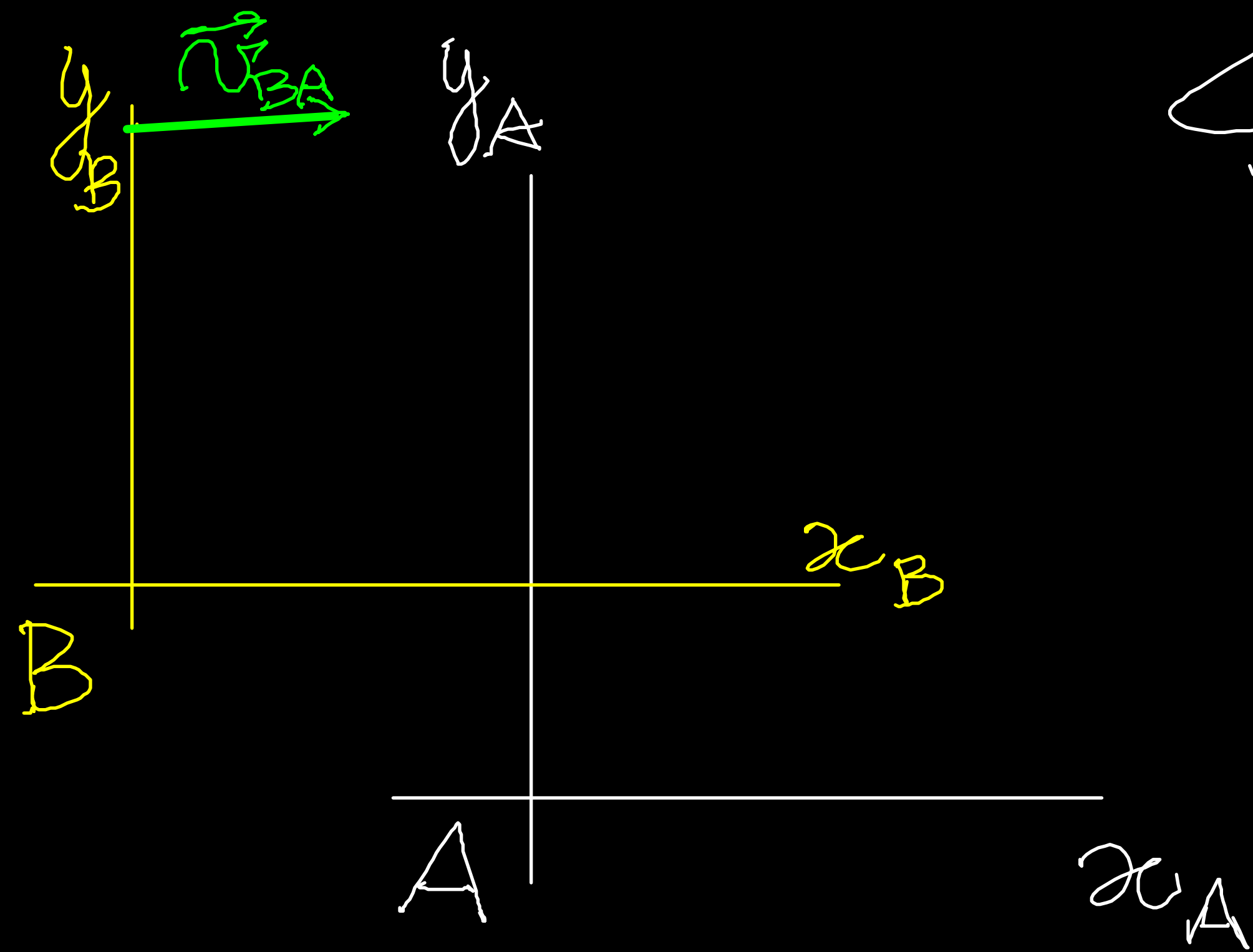
\vec{v}_{BA}

4.7 Moti relativi



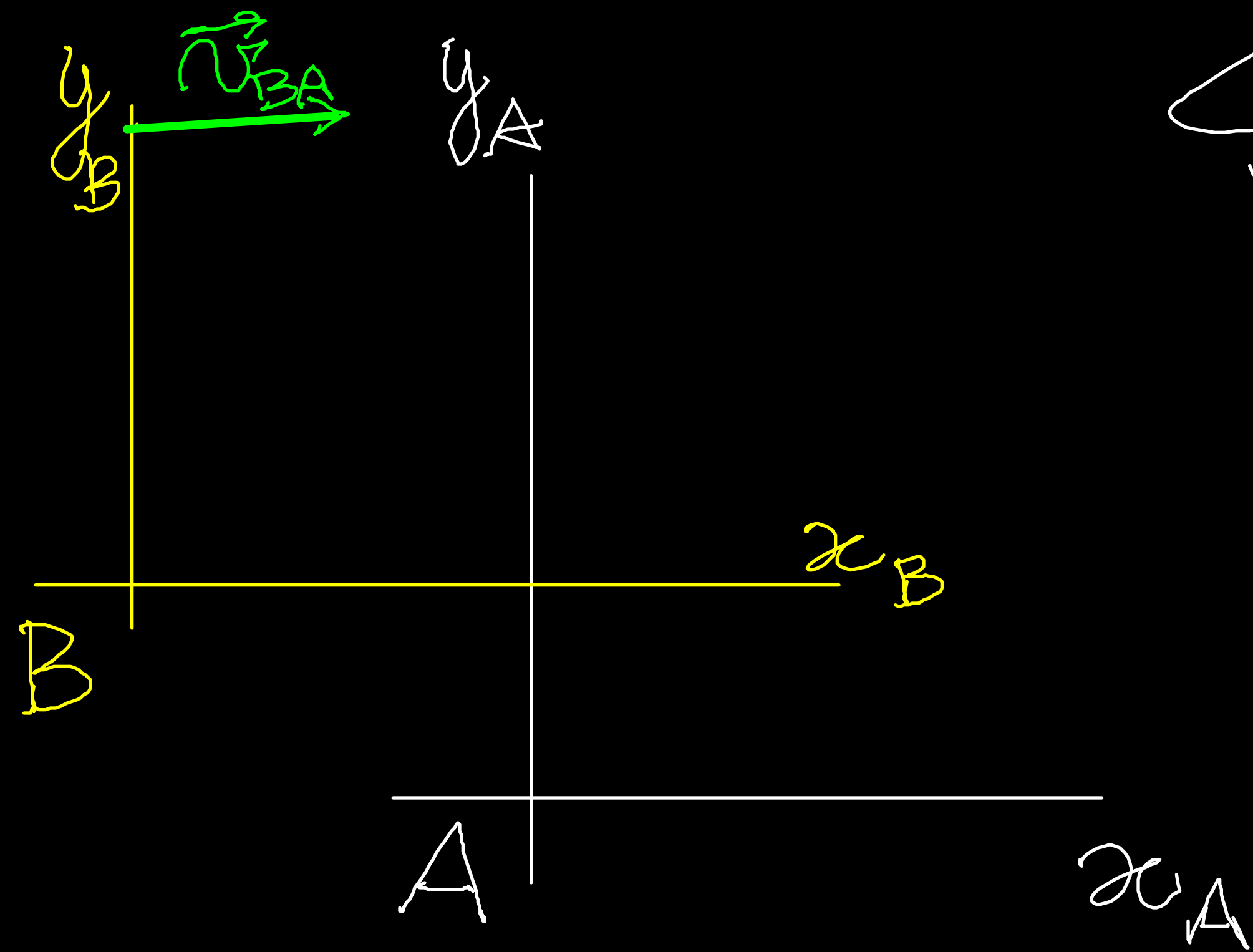
\vec{v}_{BA}

4.7 Moti relativi



\vec{v}_{BA}

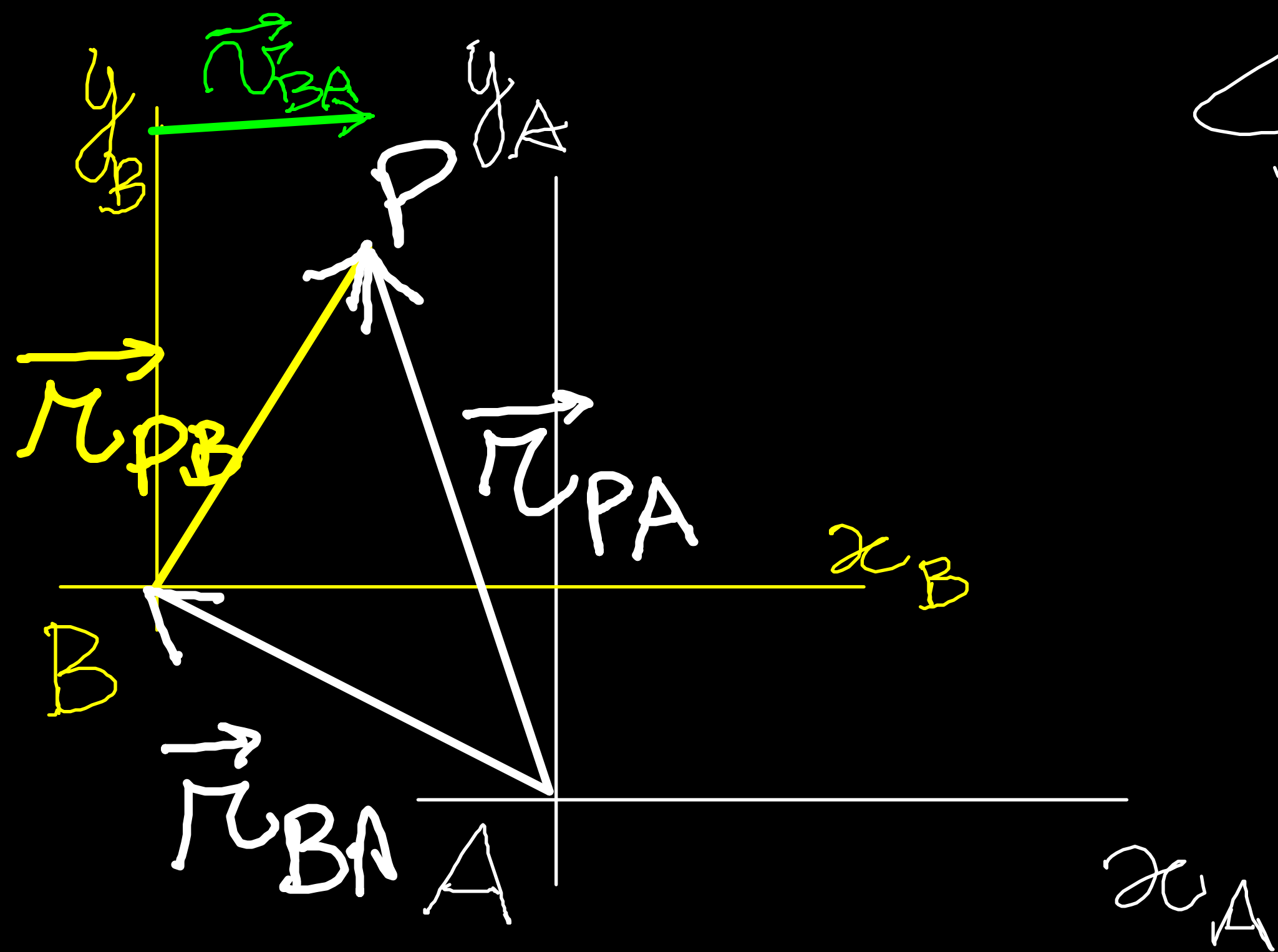
4.7 Moti relativi



\vec{v}_{BA}

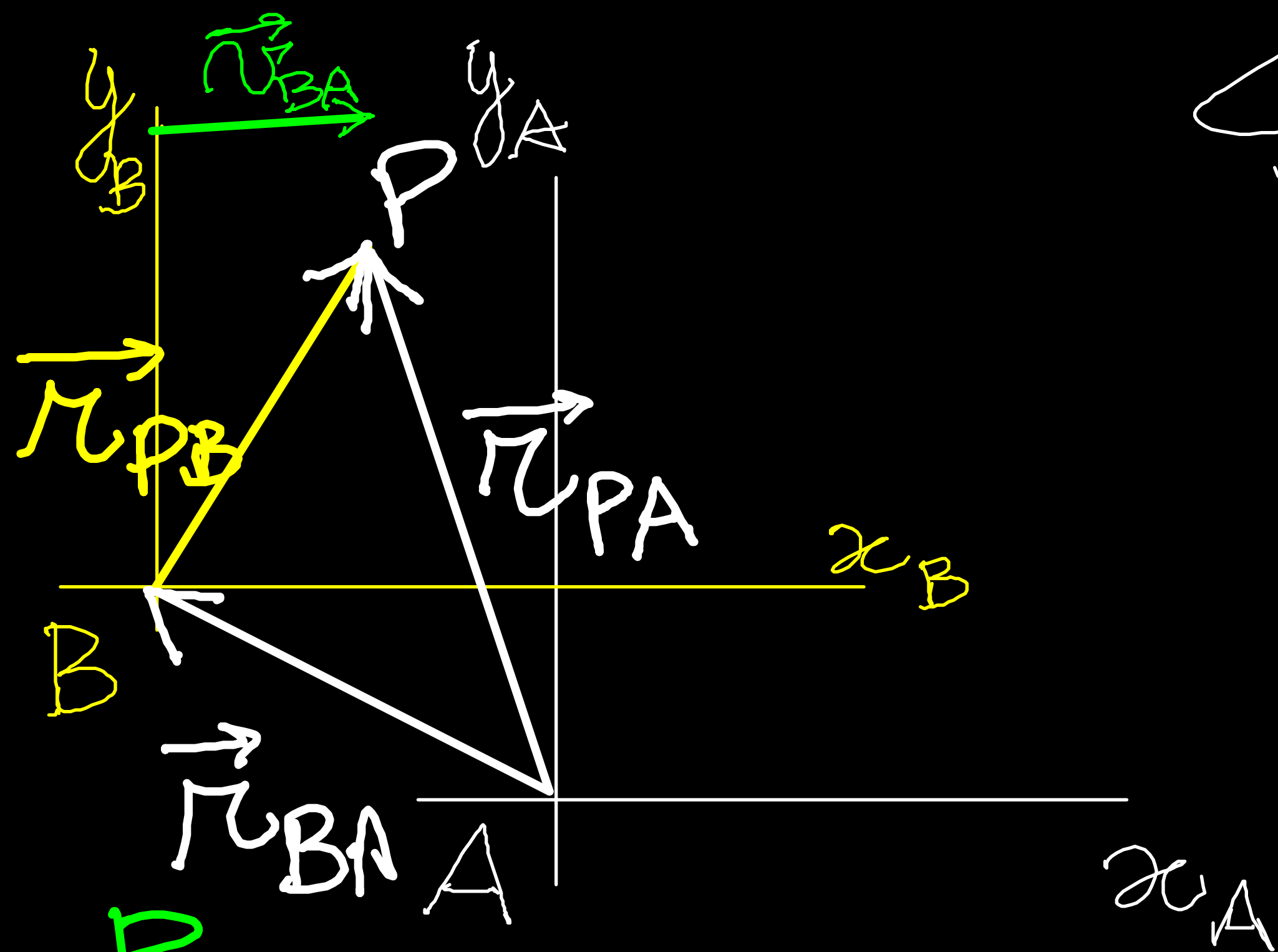
4.7

Moti relativi


 \vec{v}_{BA}

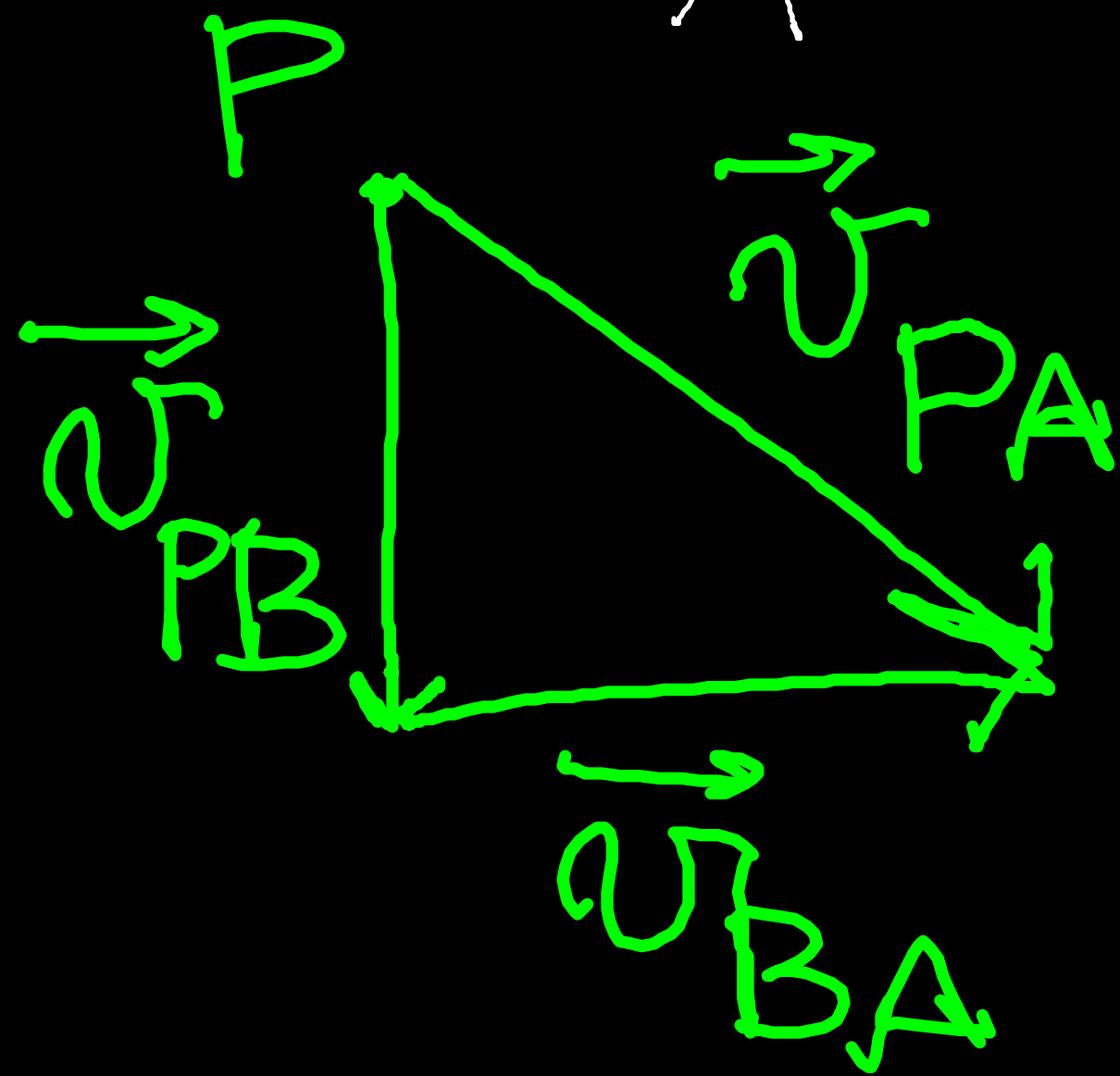
$$\vec{v}_{PA} = \vec{v}_{PB} + \vec{v}_{BA}$$

4.7 Moti relativi



\vec{v}_{BA} cost

$$\vec{r}_{PA} = \vec{r}_{PB} + \vec{r}_{BA}$$



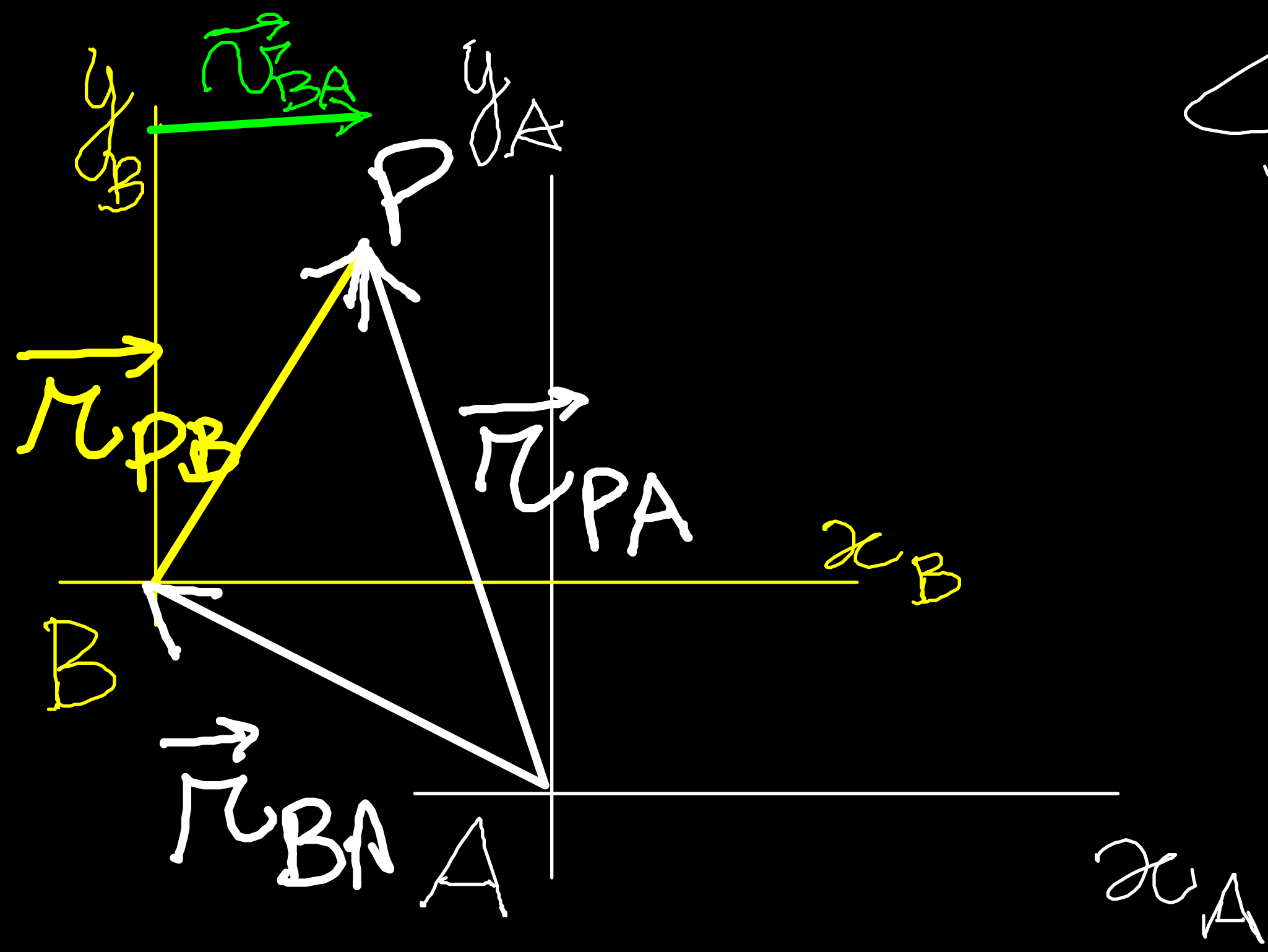
$$\frac{d\vec{r}_{PA}}{dt} = \frac{d\vec{r}_{PB}}{dt} + \frac{d\vec{r}_{BA}}{dt}$$

$$\vec{v}_{PA} = \vec{v}_{PB} + \vec{v}_{BA}$$

$$\frac{d\vec{v}_{PA}}{dt} = \frac{d\vec{v}_{PB}}{dt} + \frac{d\vec{v}_{BA}}{dt}$$

4.7

Moti relativi



\vec{v}_{BA}

$$\vec{r}_{PA} = \vec{r}_{PB} + \vec{v}_{BA}$$

Es.

A seduto panchina staz

B " su treno

P un corpo che casca vic B

\vec{v}_{BA} cost

1) \vec{v}_{BA} cost

$$\vec{Q}_{PA} = \vec{Q}_{PB}$$

Nell'esempio treno

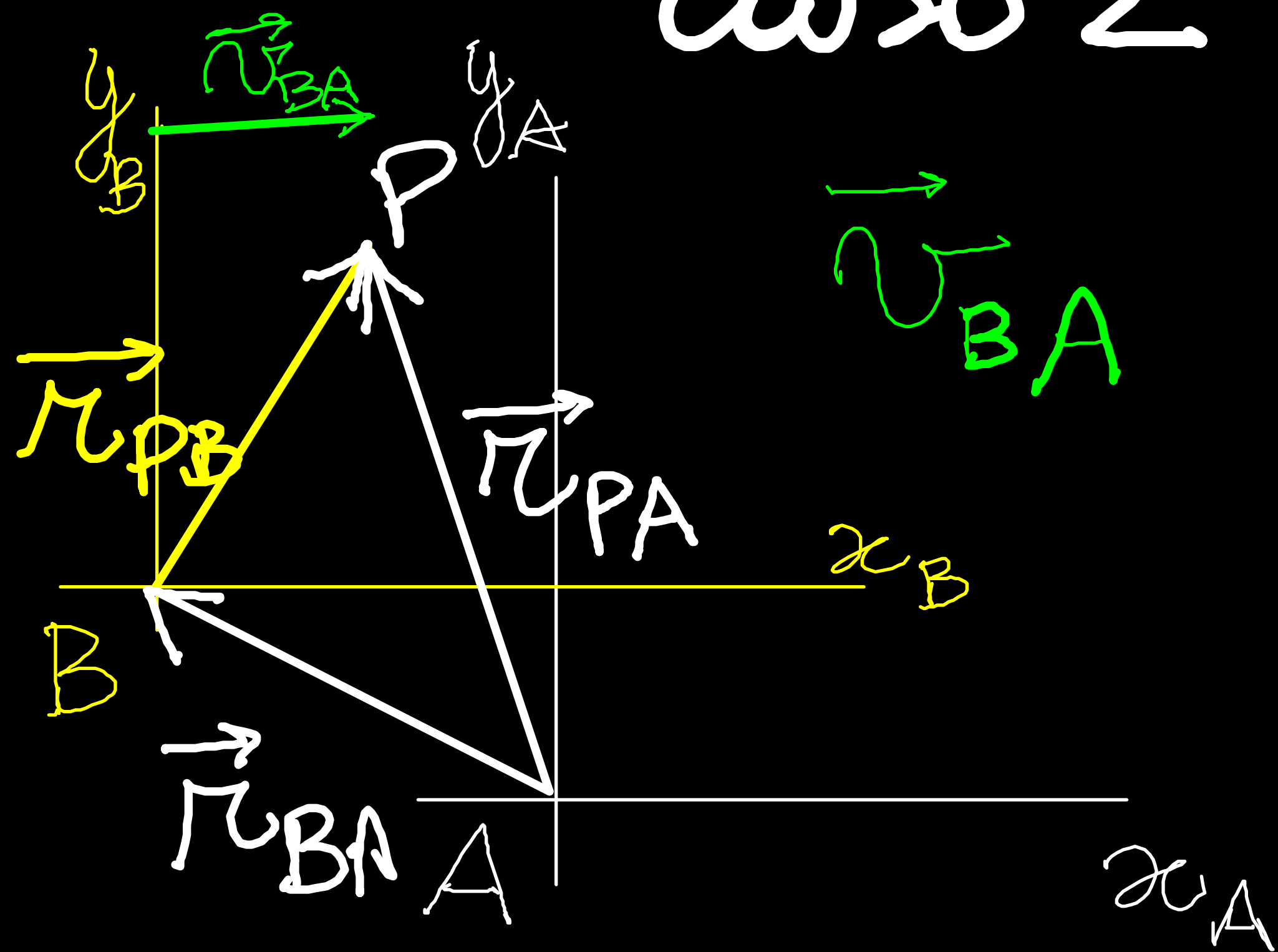
B traiettoria caduta vert

A " parabolica

Caso 2

Traslazione accelerata

mantiene direzione

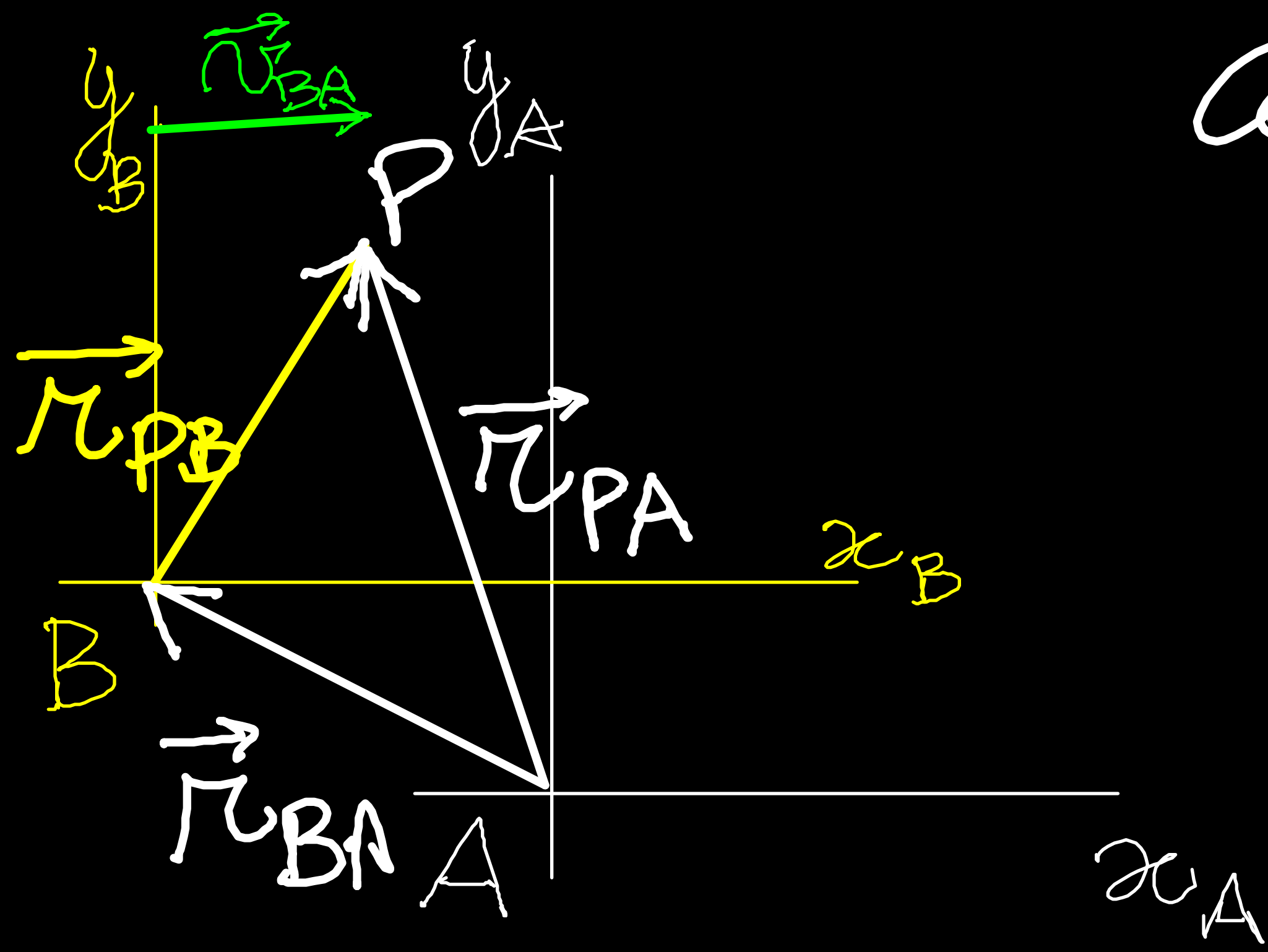


$$\vec{r}_{PA} = \vec{r}_{PB} + \vec{r}_{BA}$$

$$\vec{v}_{PA} = \vec{v}_{PB} + \vec{v}_{BA}$$

$$\vec{a}_{PA} = \vec{a}_{PB} + \vec{a}_{BA}$$

\vec{a}_{BA} acc. di traslimento
traslatorio



Case 3)
 origin A = origin B

$$\vec{r}_{BA} = 0$$

$$\vec{r}_{PA} = \vec{r}_{PB} + \vec{r}_{BA}$$

$$\vec{v}_{PA} = \vec{v}_{PB} + \vec{v}_{BA}$$

Caro 3

Rotazione pura (senza traslazione) di B risp. A

$$\vec{r}_{PA} = \vec{r}_{PB} \quad \vec{r}_{BA} = 0$$

$$\frac{d\vec{r}_{PA}}{dt} = \frac{d\vec{r}_{PB}}{dt}$$

mi metto in coord. cart

$$\vec{r}_{PB} = x_{PB} \hat{i}_B + y_{PB} \hat{j}_B + z_{PB} \hat{k}_B$$

$$\begin{aligned} &= \frac{d}{dt} (x_{PB} \hat{i}_B + y_{PB} \hat{j}_B + z_{PB} \hat{k}_B) \\ &= x_{PB} \frac{d\hat{i}_B}{dt} + y_{PB} \frac{d\hat{j}_B}{dt} + z_{PB} \frac{d\hat{k}_B}{dt} \end{aligned}$$

$\vec{\omega} \times \hat{i}_B \quad \vec{\omega} \times \hat{j}_B \quad \vec{\omega} \times \hat{k}_B$

$$\vec{v}_{PA} = \vec{v}_{PB} + \vec{\omega} \times \vec{r}_{BB}$$