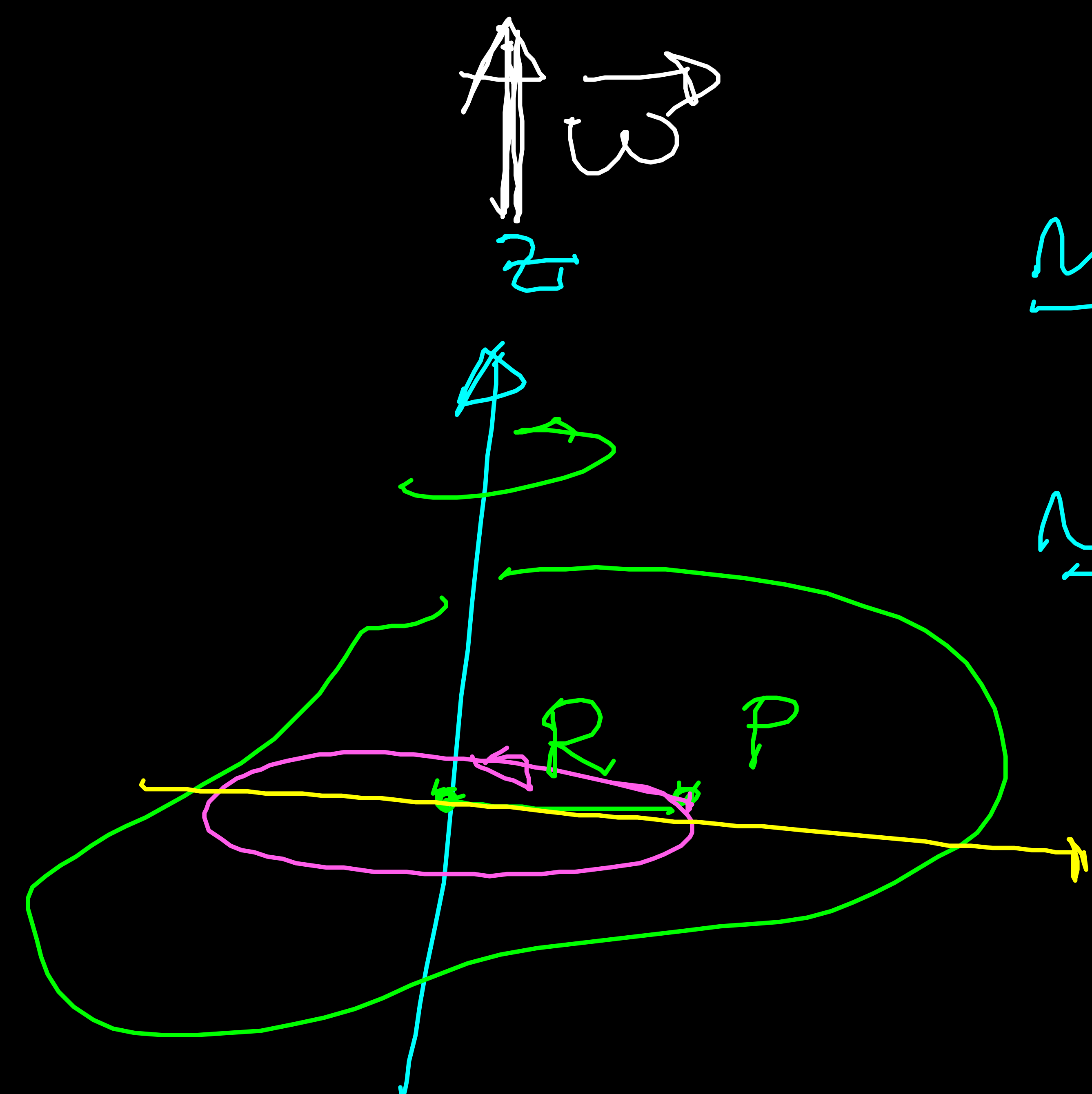
MOTO ROTATORIO DI UN CORPO RIGIDO

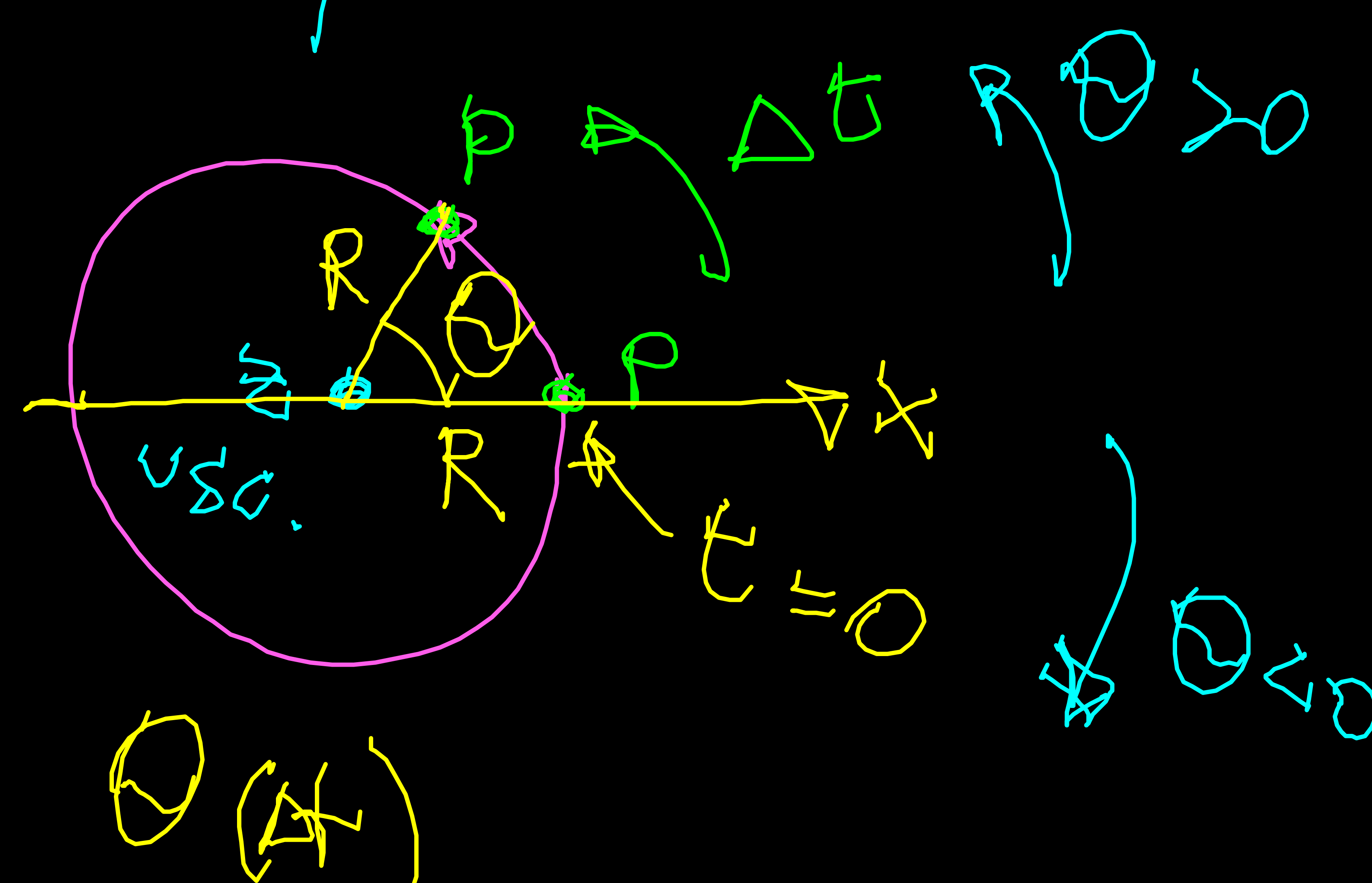


mod ← $\theta(t)$ → coordinata angolare

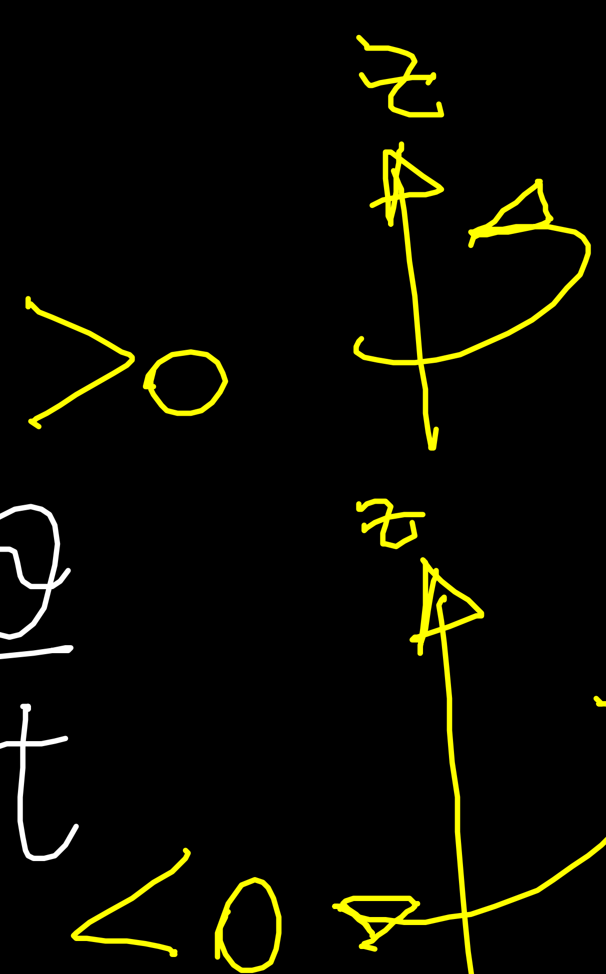
mod S ← $|\vec{\omega}| = \left|\dfrac{d\theta}{dt}\right|$ → velocità angolare (modulo)

$\vec{\omega}$ (vettore velocità angolare)

$\vec{\omega} \parallel$ asse di rotazione

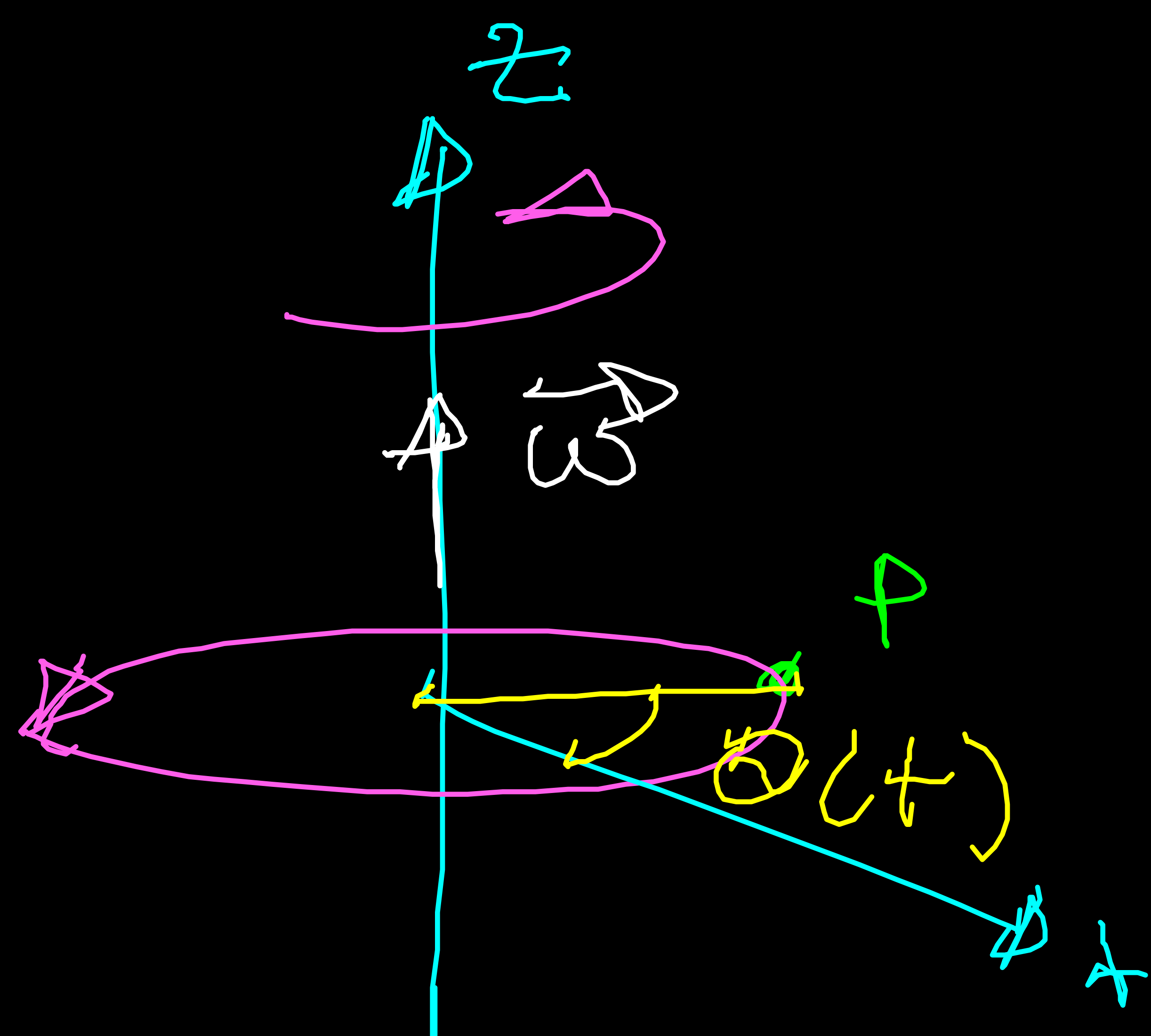


CON ASSE FISSO



$$|\vec{\omega}| = |\omega_z| \; ; \; \omega_z = \frac{d\theta}{dt}$$

ASSE FISSO



$\theta(t)$

$$\omega_z = \frac{d\theta(t)}{dt}$$

$$\alpha_z = \frac{d\omega_z}{dt} = \frac{d^2\theta}{dt^2}$$

MOTO CIRC. UNIF.

ω_z è costante

$$\alpha_z = \frac{d\omega_z}{dt} = 0$$

$$\omega_z = \frac{d\theta}{dt} \rightarrow \theta(t) = \int_0^t \omega_z dt + \theta_0$$

$$\theta(t) = \omega_z t + \theta_0$$

$\theta \rightarrow x$

$\omega_z \rightarrow v_x$

$\alpha_z \rightarrow a_x$

$\rightarrow$ moto rett. unif.

ACC. ANGOLARE COSTANTE

$\alpha_z \Rightarrow$ costante

$\omega_z(t) = \alpha_z t + \omega_0$

$\theta(t) = \theta_0 + \omega_0 t + \frac{\alpha_z}{2} t^2$

$\theta \to x$

$\omega_z \to v_x$

$\alpha_z \to a_x$

$\Rightarrow$ moto unif. accelerato

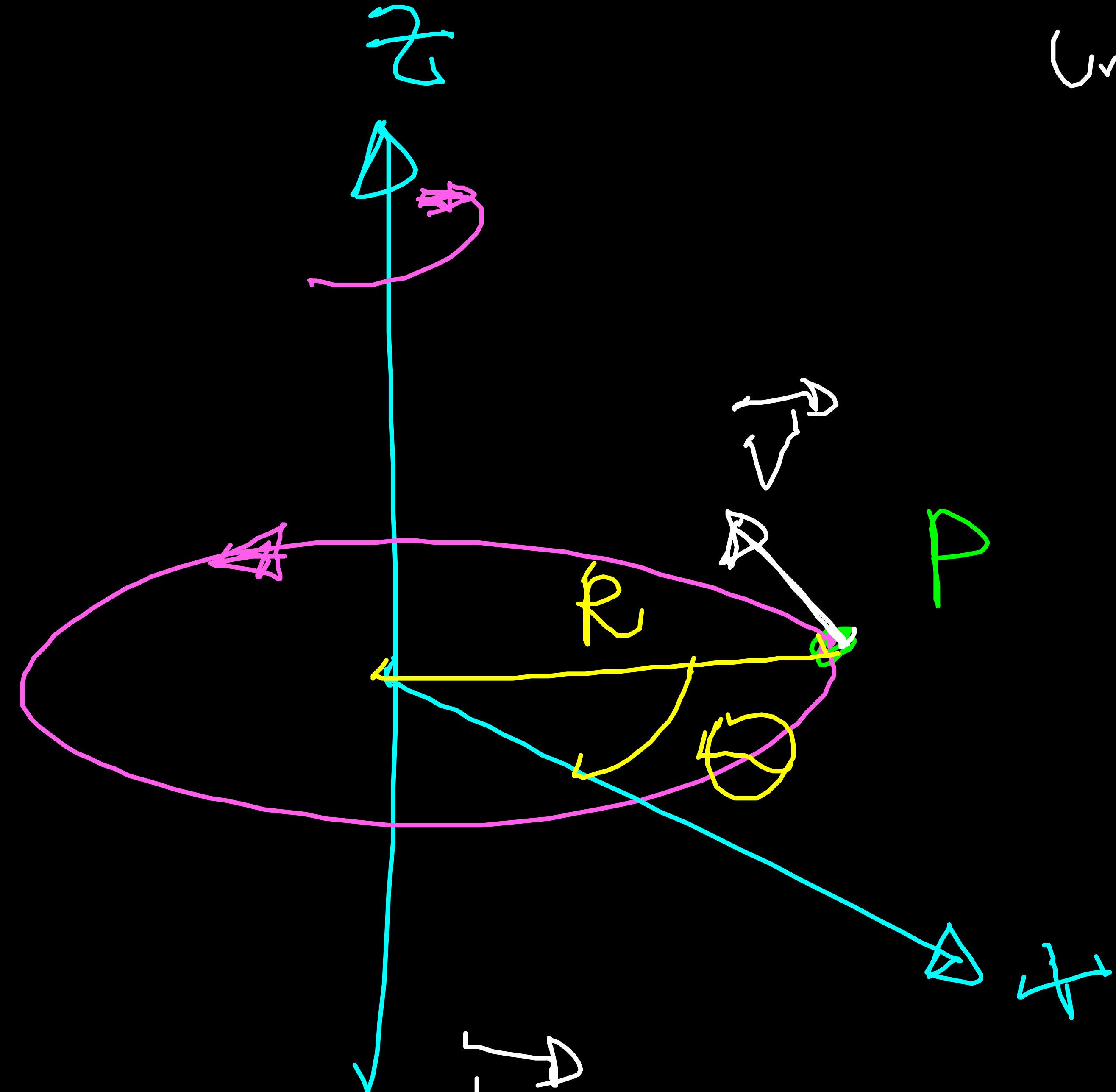
$$\frac{d\omega_z}{dt} = \alpha_z$$

$$\omega_z(t) = \int_0^t \alpha_z \, dt + \omega_0 = \alpha_z t + \omega_0$$

$$\frac{d\theta}{dt} = \omega_z \Rightarrow \theta(t) = \int_0^t (\alpha_z t + \omega_0) \, dt + \theta_0$$

$$= \frac{\alpha_z}{2} t^2 + \omega_0 t + \theta_0$$

ASSE z FISSO



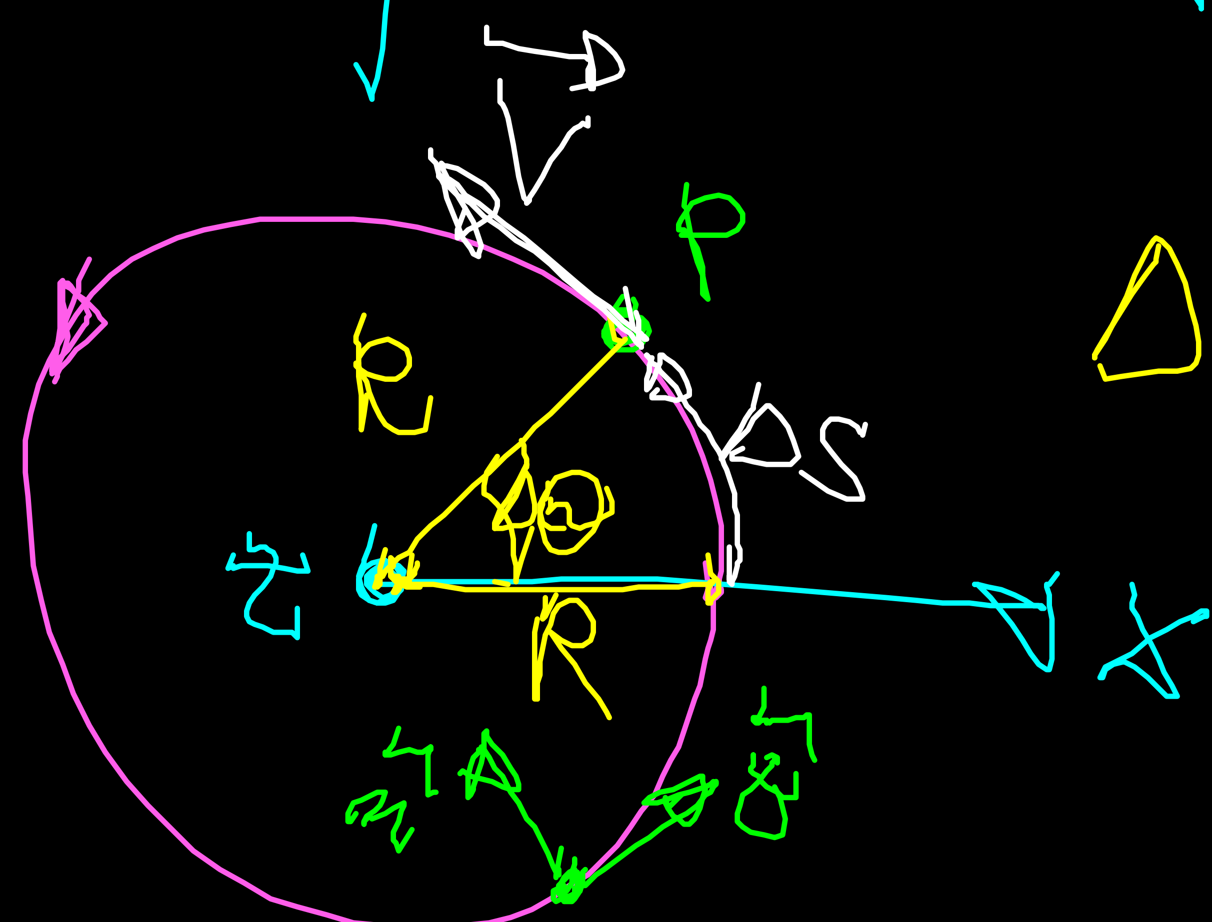
in Δt, P percorre un arco ΔS

$$|\vec{v}| = v = \frac{\Delta S}{\Delta t} = \left(\frac{\Delta\theta}{\Delta t}\right) R = |\omega_z| R$$

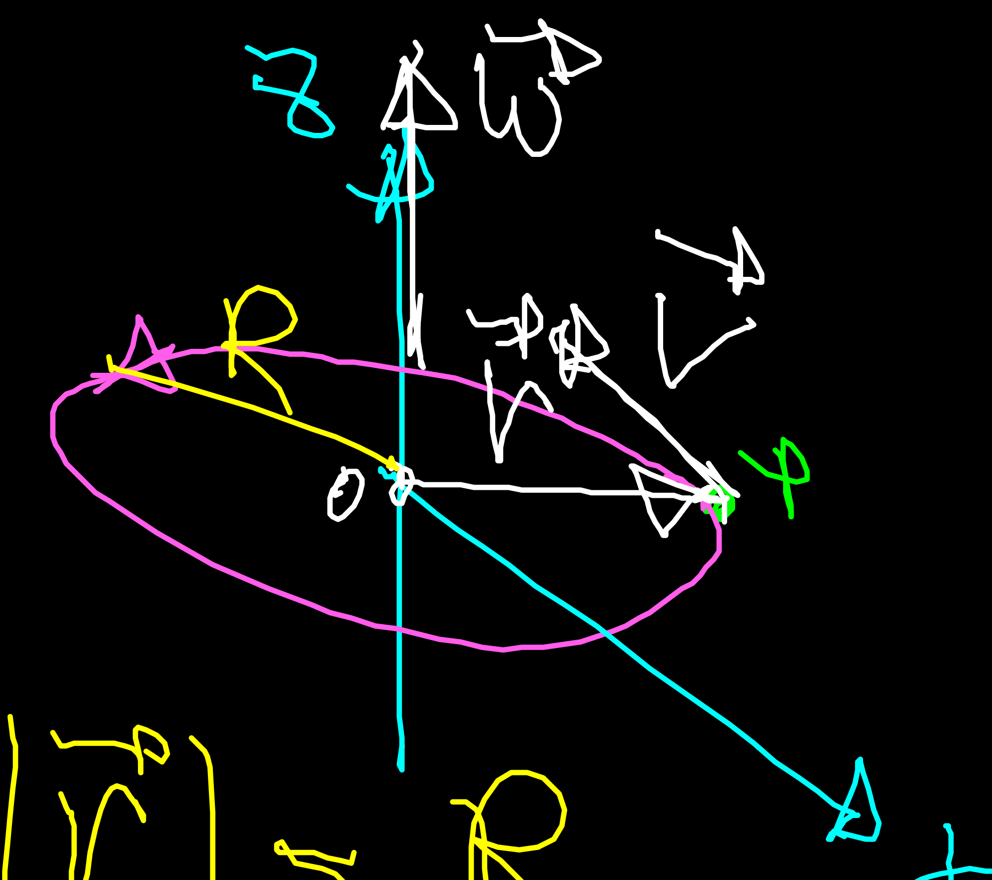
$$|\vec{v}| = |\vec{\omega}_z| R \qquad |v_{\hat{t}}| = |\vec{v}|$$

$\Delta t \to 0$

$$v_{\hat{t}} = \omega_z R = \frac{d\theta}{dt} R$$



$$\Delta\theta = \frac{\Delta S}{R}$$



$$|\vec{r}| = R$$

$$\vec{v} = \vec{\omega} \times \vec{r}$$

IN GENERALE