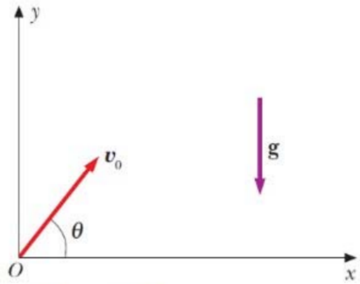
1 Moto Parabolico dei corpi



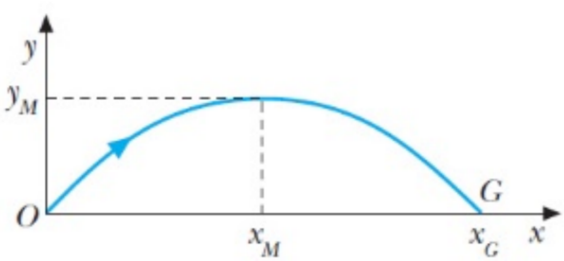
▲ **Figura 1.24** Sistema di coordinate per la descrizione del moto parabolico con accelerazione **g**.

$$\bar{a} = -g\bar{u}_z$$
$$\bar{v}(t) = \bar{v}_0 + \int_0^t \bar{g}dt = \bar{v}_0 - g\bar{u}_z t$$
$$\bar{v}(t) = v_0 \cos\theta \cdot \bar{u}_x + (v_0 \sin\theta - gt)\bar{u}_z$$
$$\bar{x}(t) = \bar{x}_0 + (v_0 \cos\theta)t\bar{u}_x + (v_0 \sin\theta - \frac{1}{2}gt^2)\bar{u}_z$$

$$\textit{Scrittura parametrica:} \begin{cases} x(t) = (v_0 \cos\theta)t \\ y(t) = v_0 \sin\theta t - \frac{1}{2}gt^2 \end{cases}$$

$$t = \frac{x}{v_0 \cos\theta}$$

$$y(x) = x\tan\theta - \frac{gx^2}{2v_0^2\cos^2\theta} \quad \textit{Equazione della traiettoria}$$



▲ **Figura 1.25** Traiettoria parabolica di un punto.

Figure 1: Traiettoria del moto parabolico

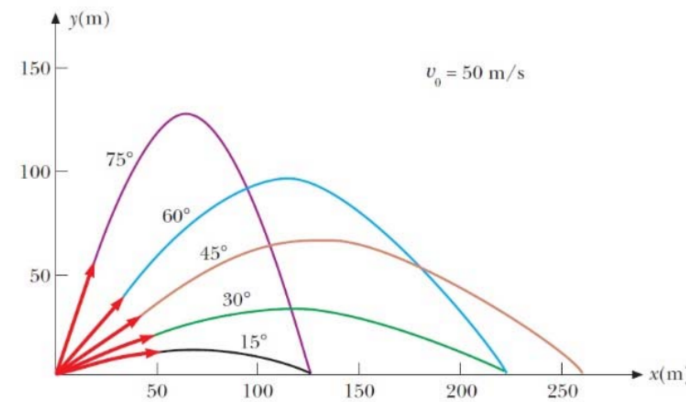
$$y = 0 \implies x\tan\theta - \frac{gx^2}{2v_0^2\cos^2\theta} = 0$$

RECUPERA 1:27 - 1:35

1.1 Angoli e gittata

$$x_g = \frac{2v_0^2\cos\theta\sin\theta}{g} = \frac{v_0^2\sin 2\theta}{g} \quad \textit{Gittata}$$

$$\frac{dx_g}{d\theta} = \frac{2v_0^2(-\sin\theta)\sin\theta}{g} + \frac{2v_0^2\cos^2\theta}{g} = \frac{2v_0^2}{g}(cos^2\theta - \sin^2\theta) \iff \cos^2\theta = \sin^2\theta \iff \theta = \frac{\pi}{4}$$



y(m)
150
100
50
$v_0 = 50$ m/s
75°
60°
45°
30°
15°
50
100
150
200
250
x(m)