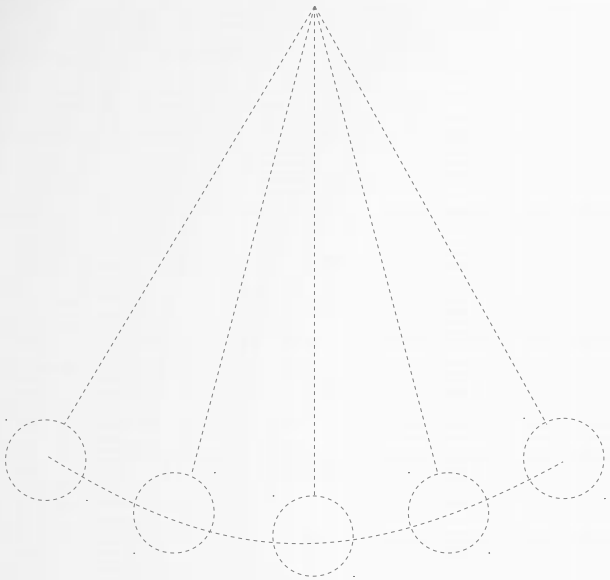
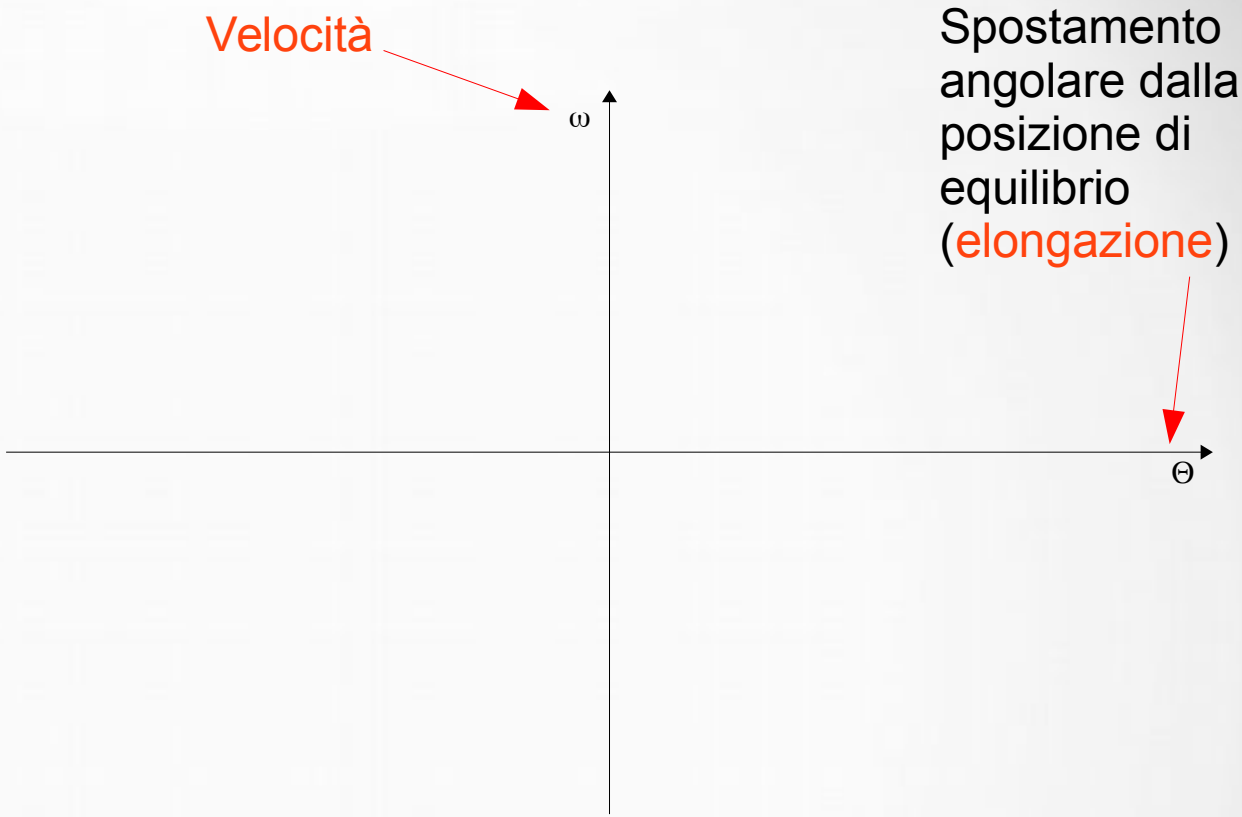
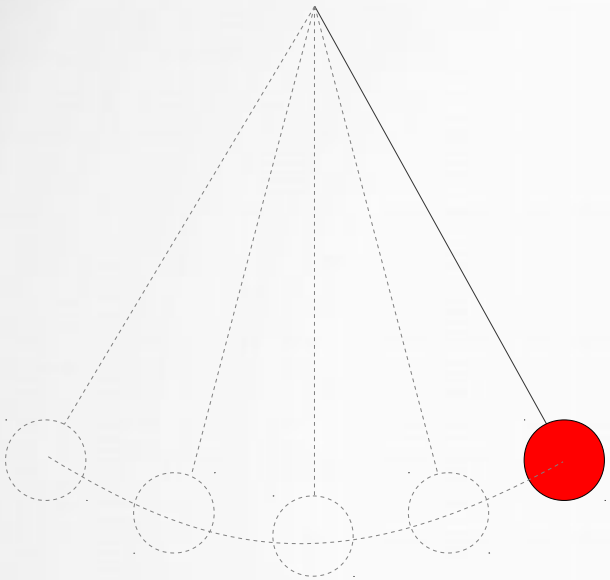
Spazio delle fasi e attrattori

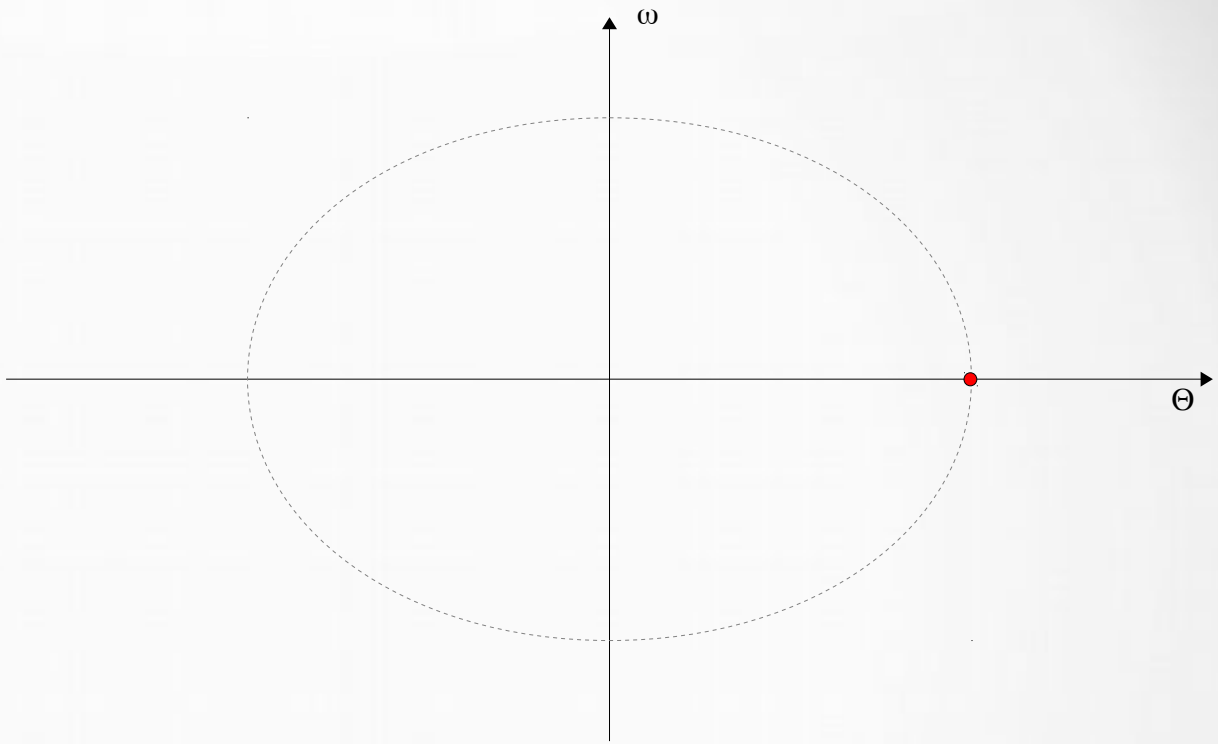




- Le variabili di stato del sistema pendolo senza attrito (velocità ed elongazione) vengono associate a una coordinata nello spazio delle fasi

Spazio delle fasi e attrattori

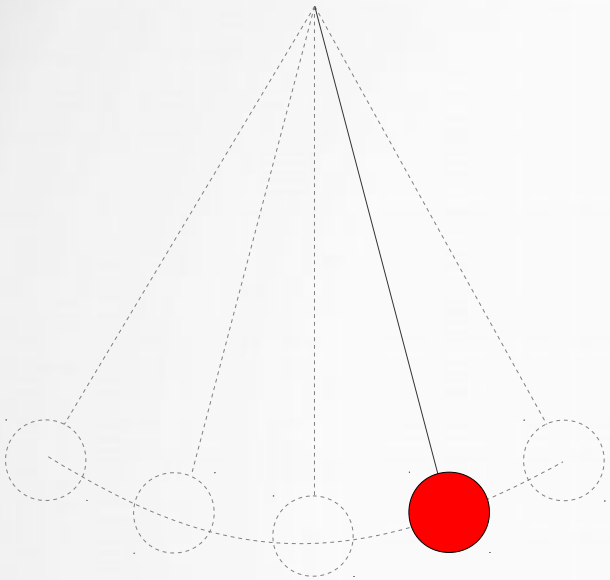


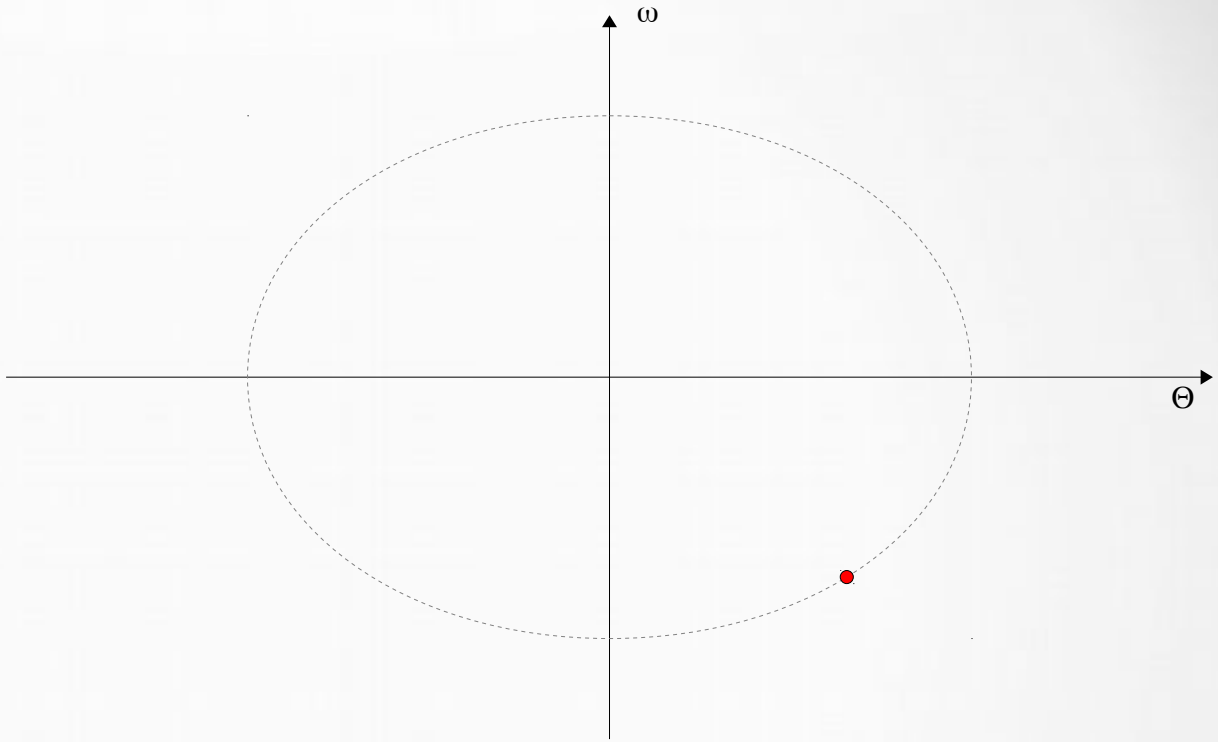


Elongazione = positiva max

Velocità = nulla

Spazio delle fasi e attrattori

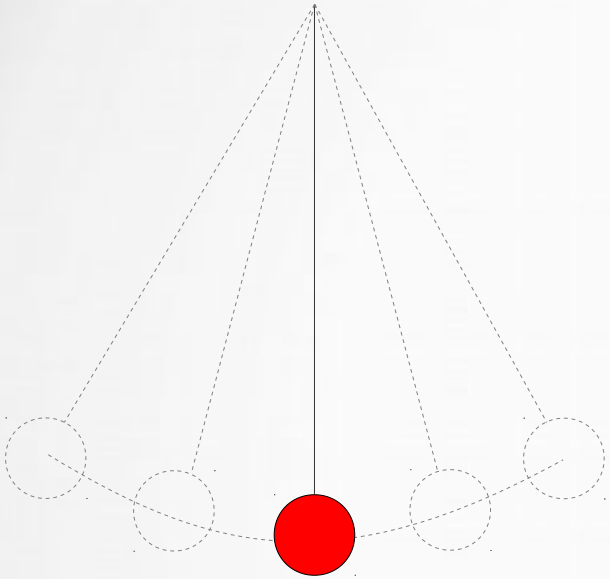


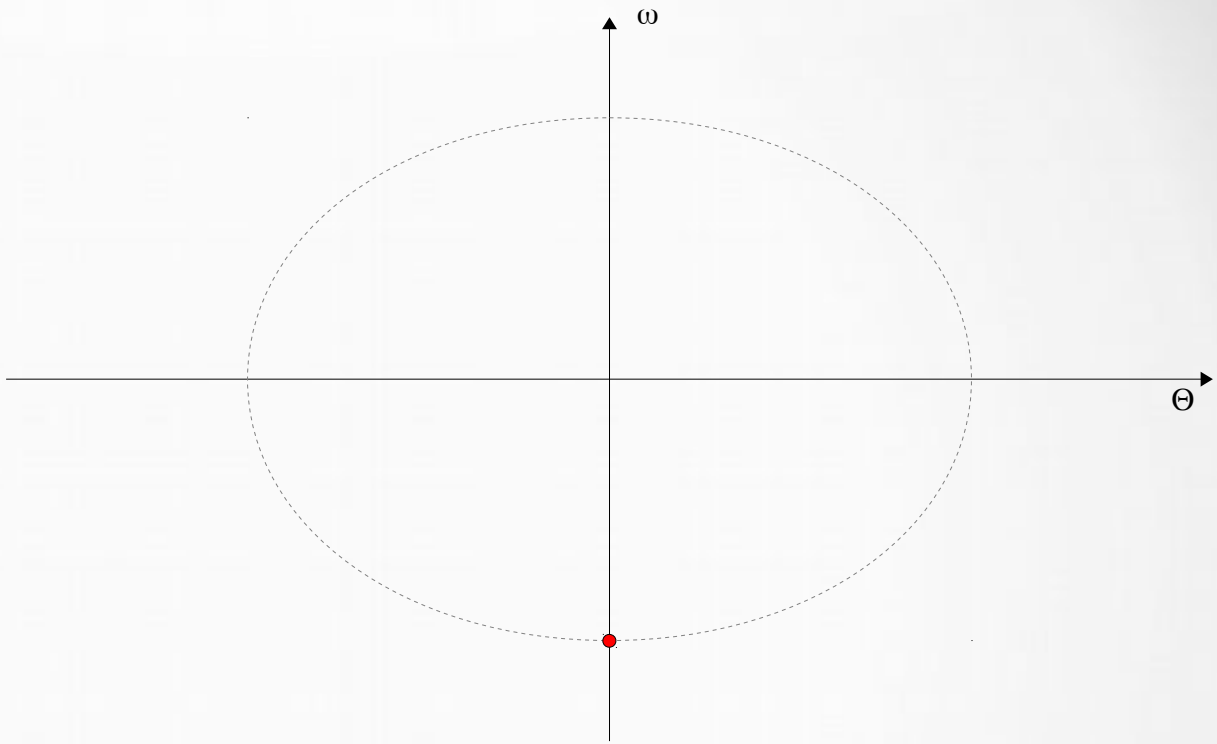


Elongazione = positiva med

Velocità = negativa med

Spazio delle fasi e attrattori

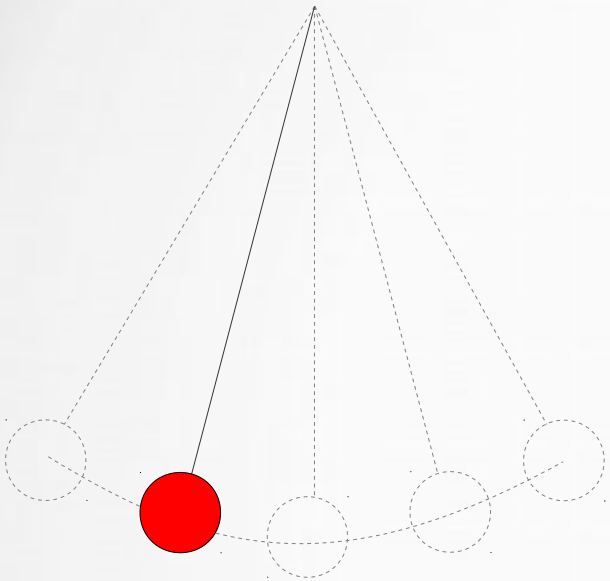


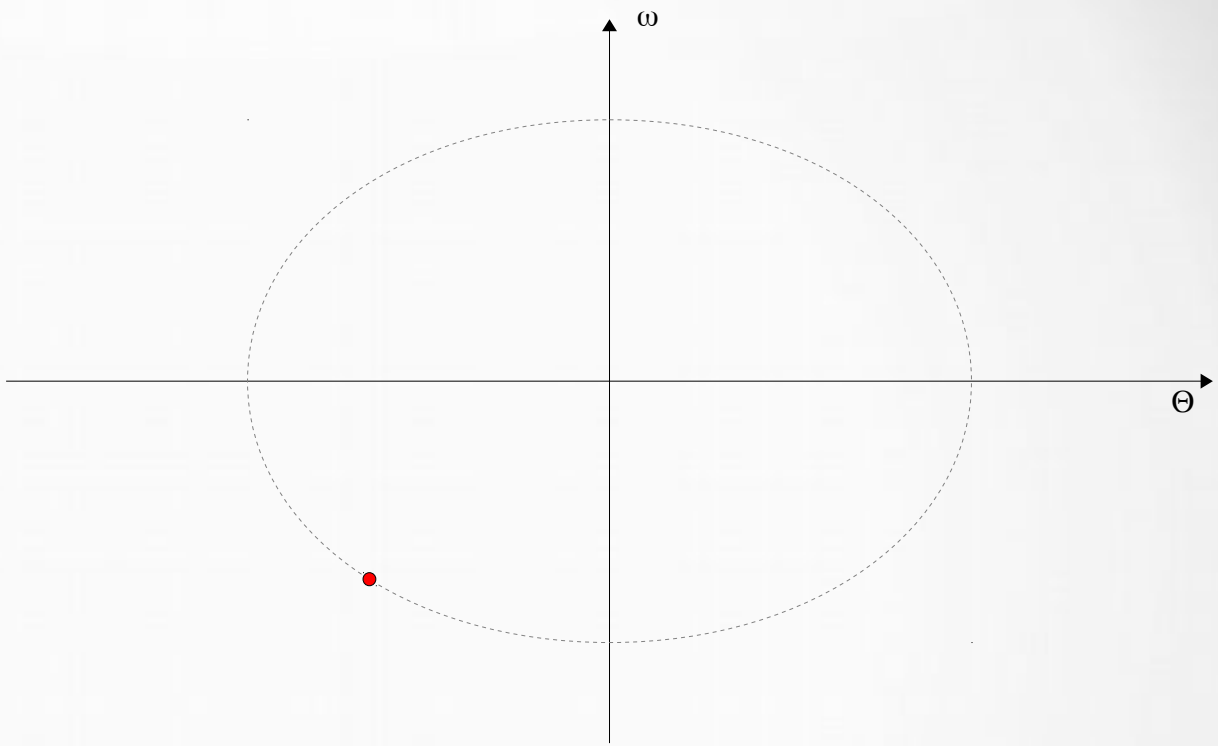


Elongazione = nulla

Velocità = negativa max

Spazio delle fasi e attrattori

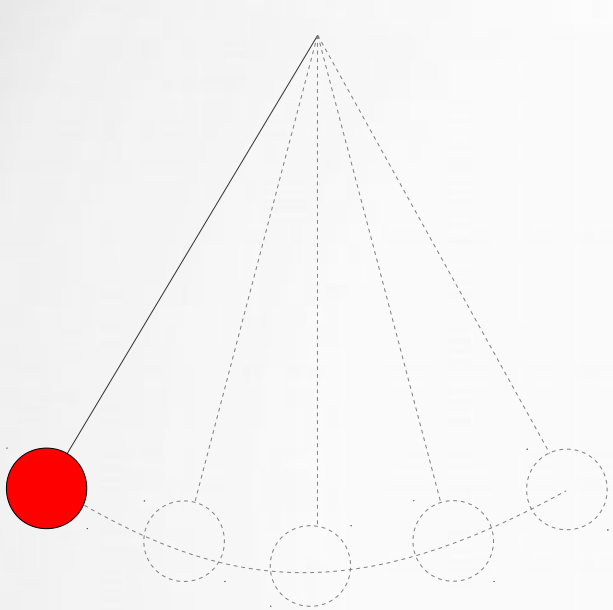


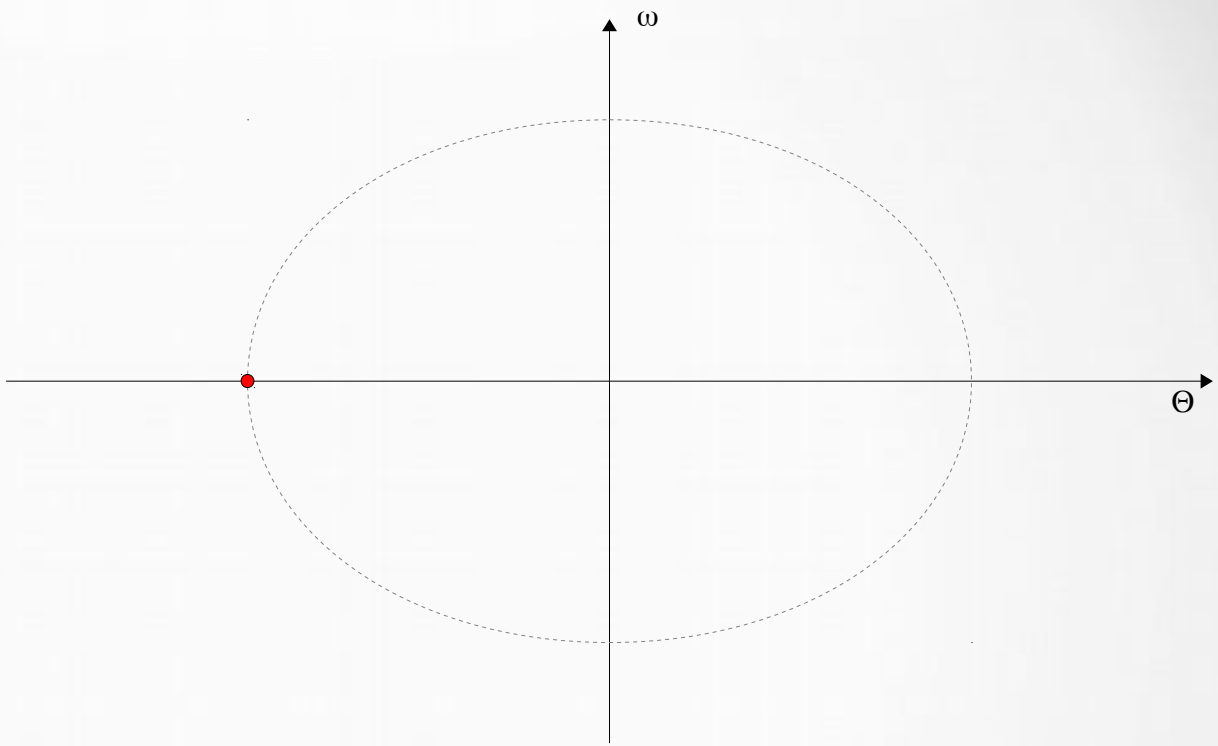


Elongazione = negativa med

Velocità = negativa med

Spazio delle fasi e attrattori

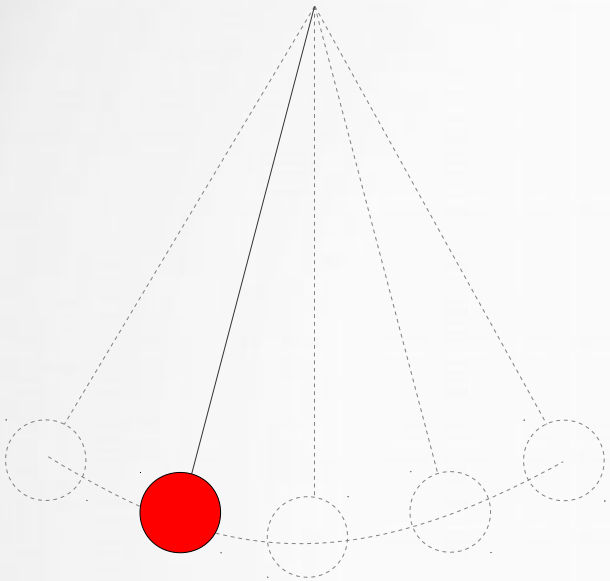


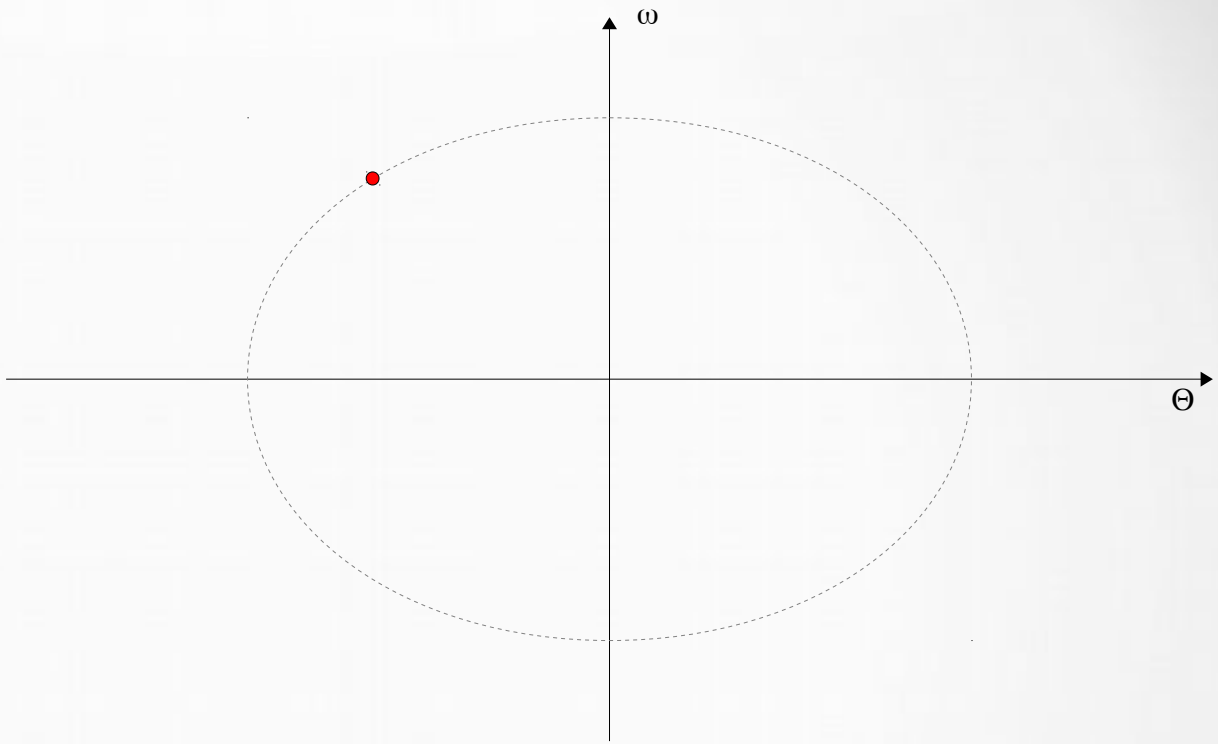


Elongazione = negativa max

Velocità = nulla

Spazio delle fasi e attrattori

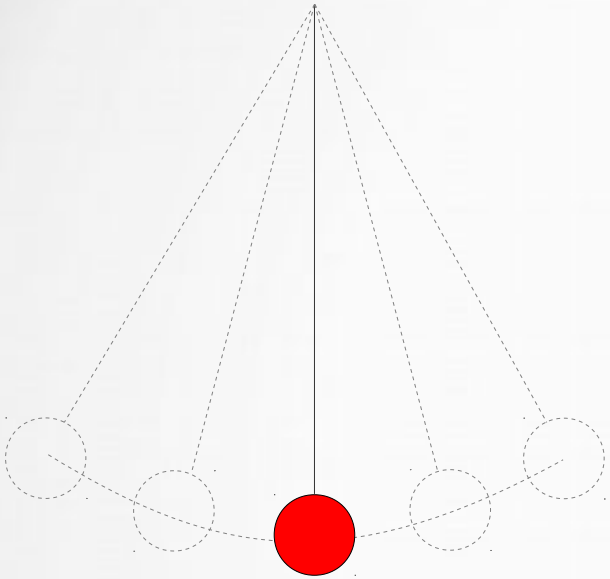


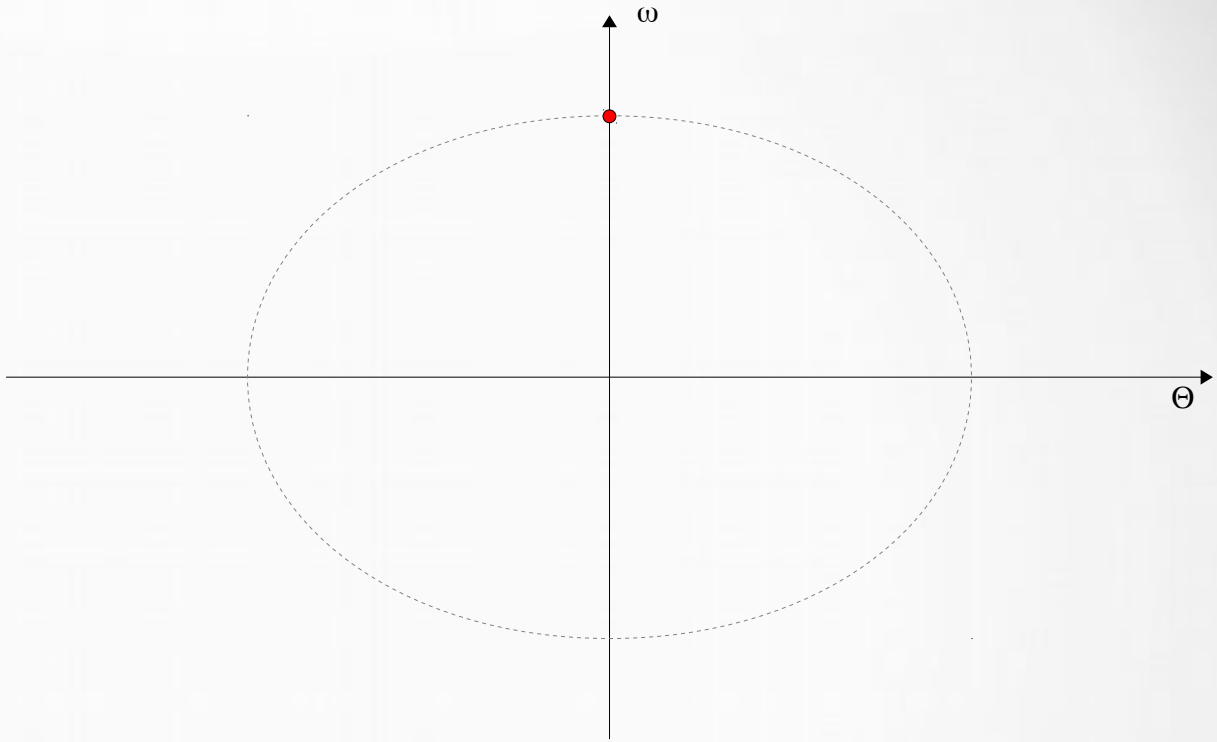


Elongazione = negativa med

Velocità = positiva med

Spazio delle fasi e attrattori

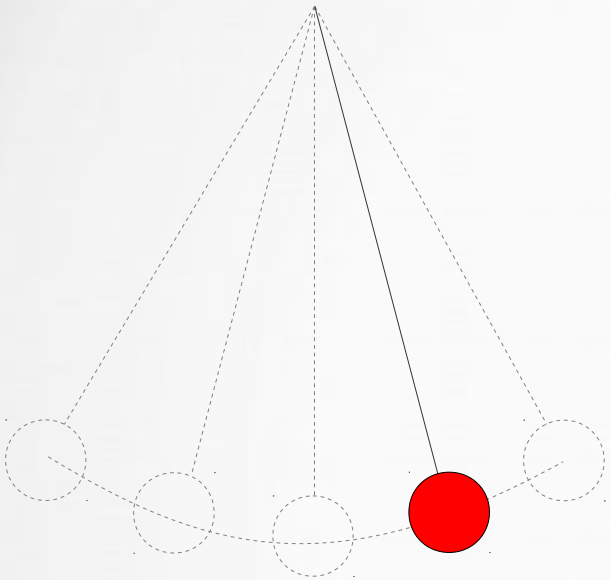


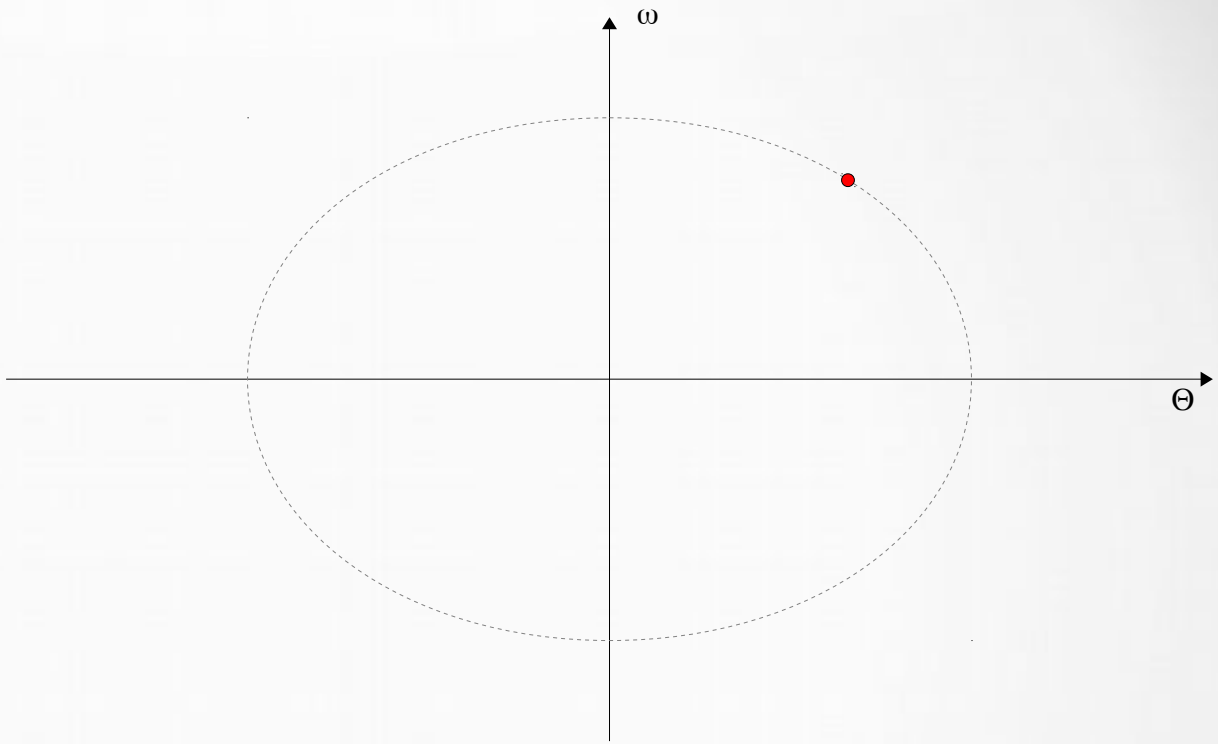


Elongazione = nulla

Velocità = positiva max

Spazio delle fasi e attrattori

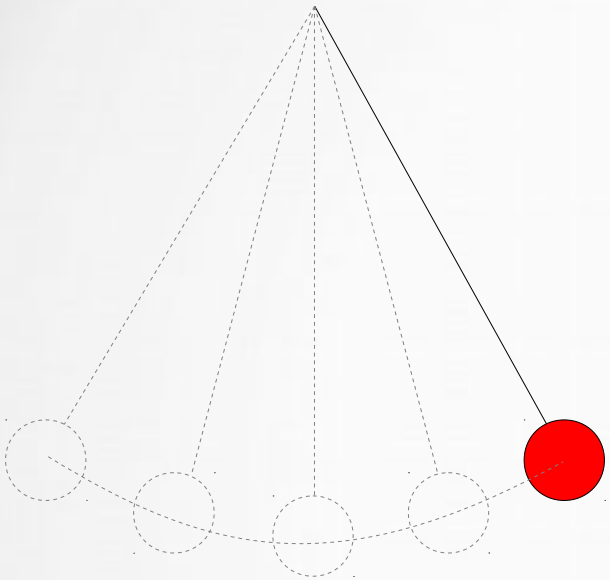


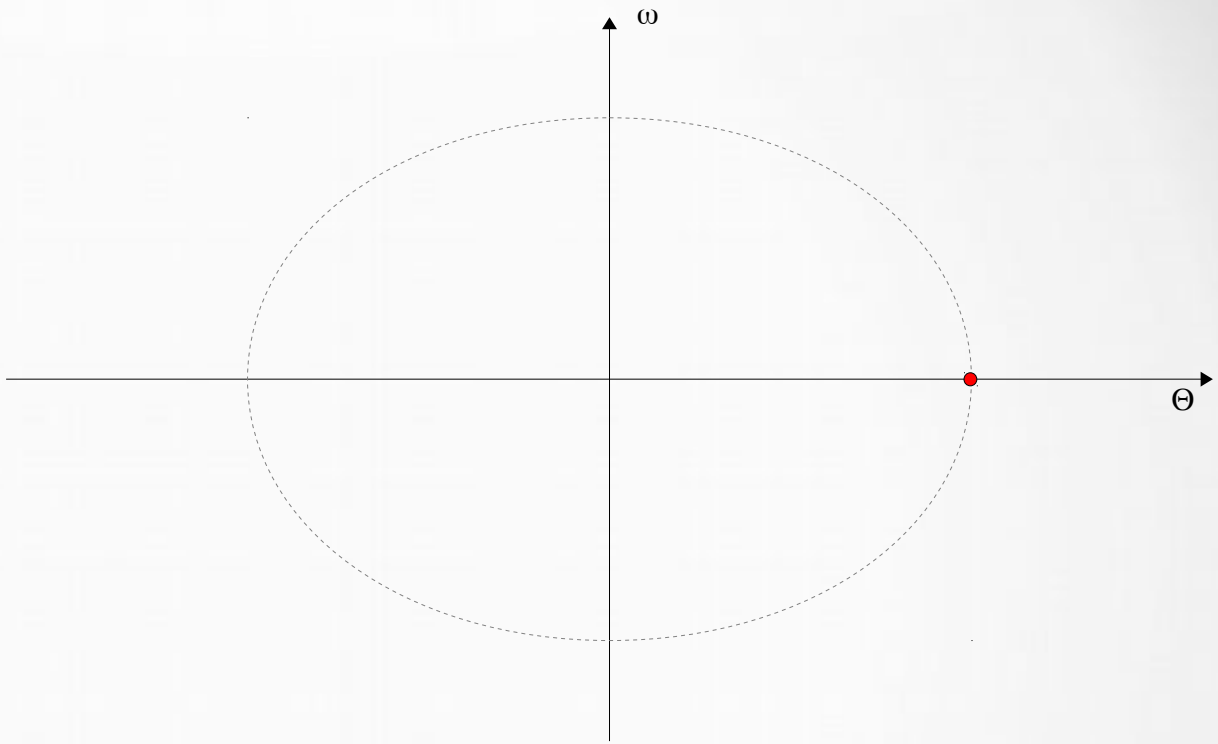


Elongazione = positiva med

Velocità = positiva med

Spazio delle fasi e attrattori

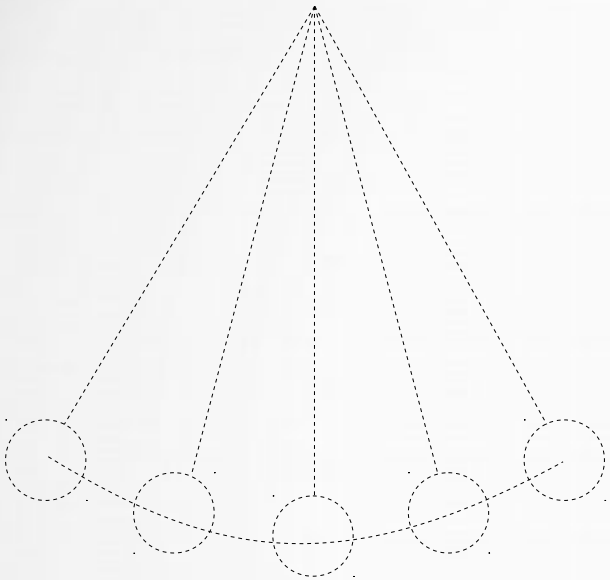


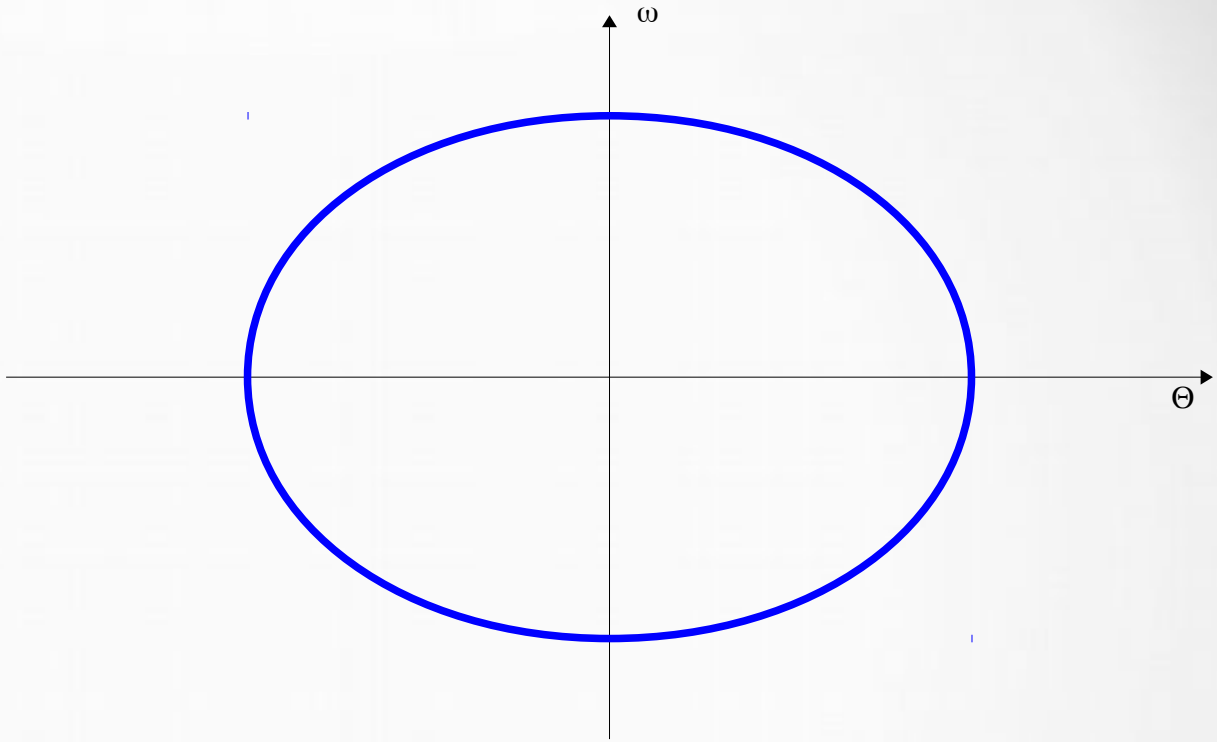


Elongazione = positiva max

Velocità = nulla

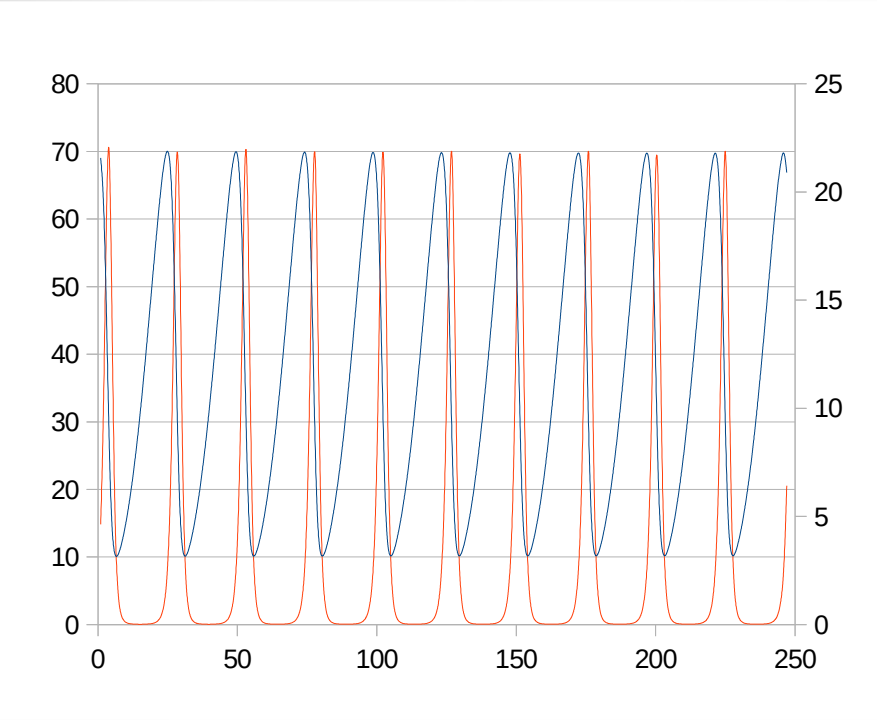
Attrattore periodico = equilibrio stabile

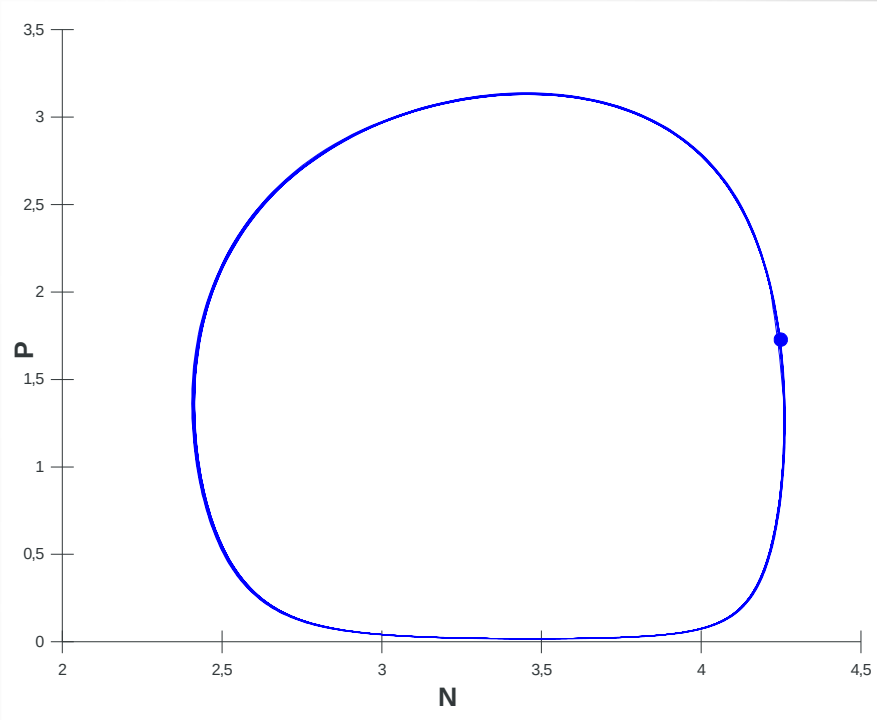




- La traiettoria nello spazio delle fasi disegna un anello chiuso (attrattore ciclo limite):
  il sistema oscilla periodicamente

Attrattore periodico = equilibrio stabile





Modello Ospite-Parassitoide

Beddington et al. (1978)

$$N_{t+1} = N_t \, e^{\,r\,(1-Nt/K)} \, e^{-aPt}$$

$$P_{t+1} = N_t \, e^{-aPt}$$