Choques

Laboratorio 1D

Clase 9

08/06/24

Magnitudes:

* $E_{mec} = \underbrace{E_{cin}}_{\frac{1}{2}mv^2} + \underbrace{E_{pot}}_{mgh}$

* Momento Linear $\bar{P} = m \cdot \bar{v}$

↳ $\bar{F} = m \cdot \bar{a} = m \cdot \frac{d\bar{v}}{dt} = \frac{d}{dt}\left(m \cdot \bar{v}\right) = \frac{d\bar{P}}{dt}$

Leyes de Conserv.

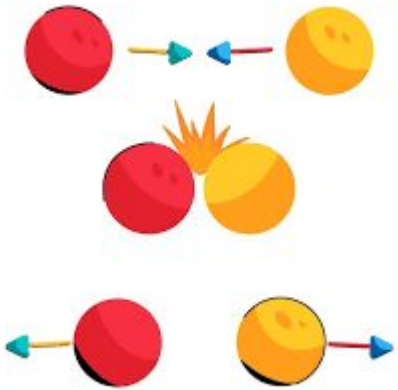
- $\Sigma F_{ext} = 0 \Rightarrow \vec{P} = cte$

- si $W_{NC} = 0 \Rightarrow E_{mec} = cte$

Tipos de Choques

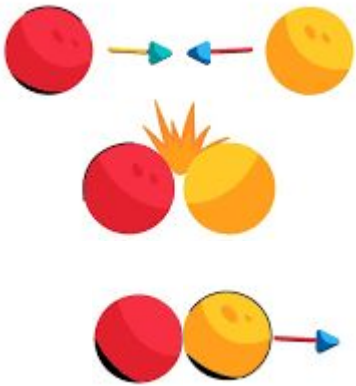
Elástico

- $\vec{P} = cte$
- $E_{mec} = cte$



Plástico

- $\vec{P} = cte$
- NO se conserva la energía



[se mueven juntos]

¿Qué significa que se conserva el impulso??

como $\sum F_{ext} = 0 \Rightarrow \Delta \vec{P} = cte$

$$\vec{P}_1 + \vec{P}_2 = \vec{P}_1^{\,0} + \vec{P}_2^{\,0}$$

$$\Rightarrow m_1 \vec{v}_1 + m_2 \vec{v}_2 = m_1 \vec{v}_{10} + m_2 \vec{v}_{20}$$

1D

$$m_1 (v_1 - v_{10}) = -m_2 (v_2 - v_{20})$$

Colisión Elástica:

Si se conserva la E_{Mec}: $E_{mec}^{inicial} = E_{Mec}^{final}$

$$\frac{1}{2} m_1 v_{1o}^2 + \frac{1}{2} m_2 v_{2o}^2 = \frac{1}{2} m_1 v_{1F}^2 + \frac{1}{2} m_2 v_{2F}^2$$

$$\boxed{m_1 \left[v_{1o}^2 - v_{1F}^2 \right] = m_2 \left[v_2^2 - v_{2o}^2 \right]}$$

Colisión Elástica:

1) Por conservación de la Energía

$$m_1\left[\left(v_1^{\circ} - v_1\right)\left(v_1^{\circ} + v_1\right)\right] = -m_2\left[\left(v_2^{\circ} - v_2\right)\left(v_2^{\circ} + v_2\right)\right]$$

2) Por conservación del momento

$$m_1\left(v_1 - v_1^{\circ}\right) = -m_2\left(v_2 - v_2^{\circ}\right)$$

∇ !

Colisión Elástica:

$$m_1 \left(v_1^\circ - v_1\right)\left(v_1^\circ + v_1\right) = -m_2\left(v_2^\circ - v_2\right)\left(v_2^\circ + v_2\right)$$

$$m_1\left(v_1^\circ - v_1\right)\left(v_1^\circ + v_1\right) = m_1\left(-v_1 + v_1^\circ\right)\left(v_2^\circ + v_2\right)$$

Si $\vec{P} = cte$ y $E = cte$

$$\boxed{v_1^\circ + v_1 = v_2^\circ + v_2} \Rightarrow v_2 - v_1 = -\left(v_2^\circ - v_1^\circ\right)$$

$$R = -\frac{v_2 - v_1}{v_2^\circ - v_1^\circ} \Rightarrow \boxed{R = 1}$$ si col. elástica

Colisión Plástica:

$$m_1\left(v_1 - v_1^0\right) = -\,m_2\left(v_2 - v_2^0\right)$$ de conservación de P

$$v_1 = v_2 \Rightarrow \left(m_1 + m_2\right) v_2 = m_1 v_1^0 + m_2 v_2^0$$

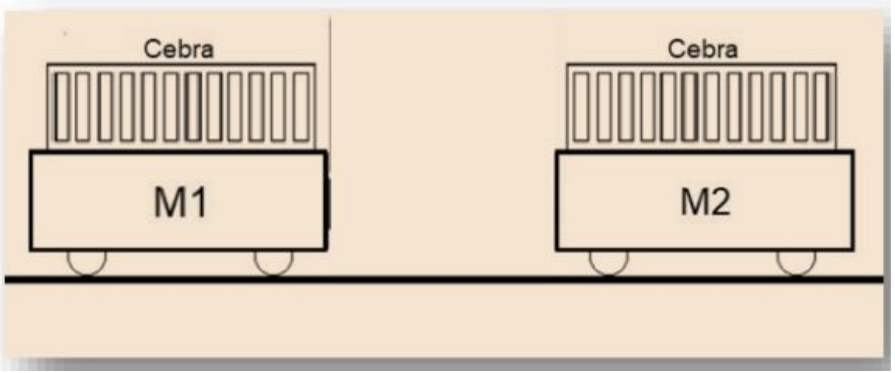
$$v_2 = \frac{v_1^0 m_1 + m_2 v_2^0}{m_1 + m_2}$$

¿Qué pasa con la Energía?

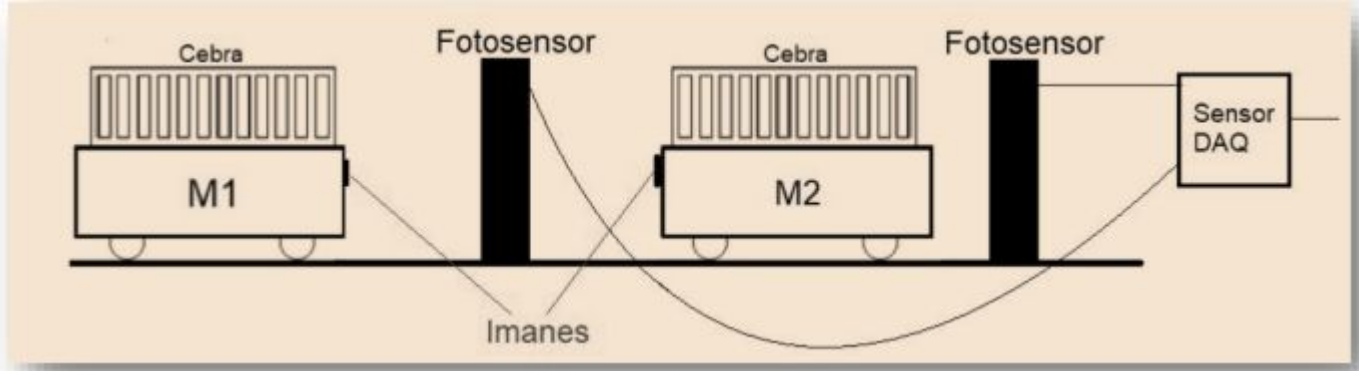
$$\Delta E = E_{cin}^{F} - E_{cin}^{0} = \frac{1}{2}\left(m_1 + m_2\right) v_2^2 - \left[\frac{1}{2} m_1 v_{10}^2 + \frac{1}{2} m_2 v_{20}^2\right]$$

Si reemplazamos v_2 podemos ver si la energía aumenta o disminuye

Lo que vamos a hacer:



Lo que vamos a hacer:



ambos quedan pegados después del choque

↓

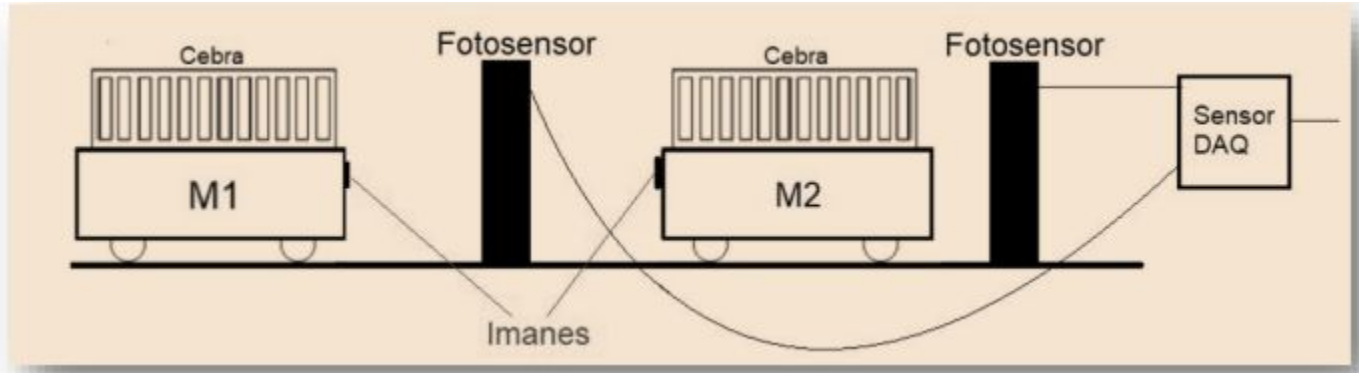
abrojos o imanes

interacción elástica

↓

Invertir los imanes

Lo que vamos a hacer:



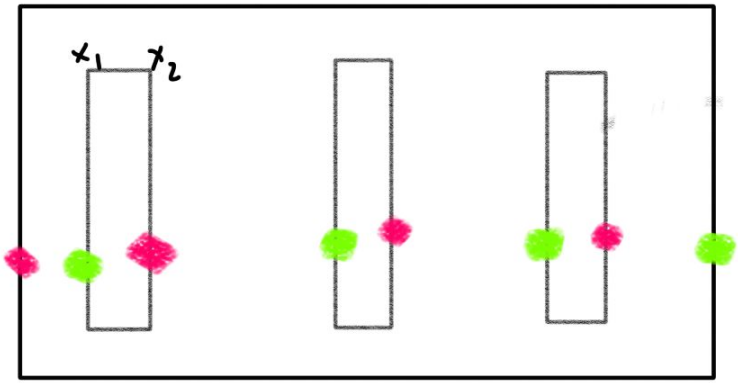
¿Cómo afecta la masa en cada caso?

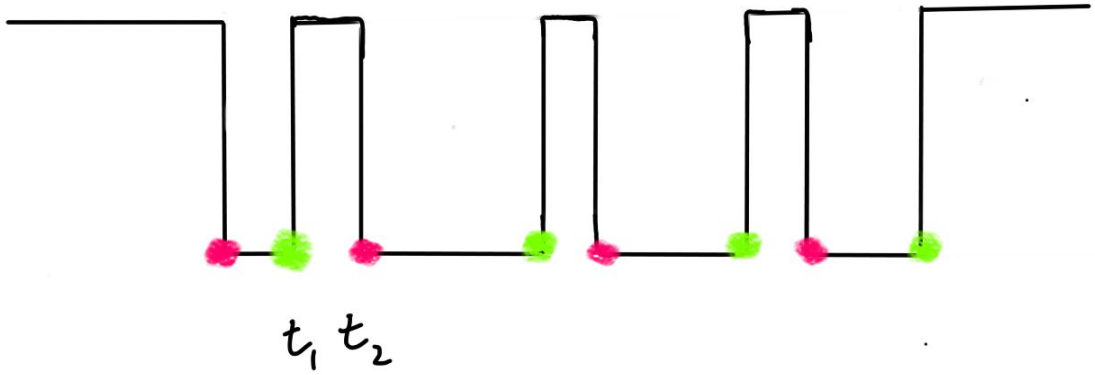
$m_1 = m_2$, $m_1 > m_2$, $m_1 < m_2$

$m_1 > m_2$ pero cuánto?

¿Tiene sentido que un carrito se detenga justo cuando pasa por un photogate?

¿Cómo obtenemos la velocidad?





•) $v = \frac{\Delta x}{\Delta t} = \frac{x_2 - x_1}{t_2 - t_1}$

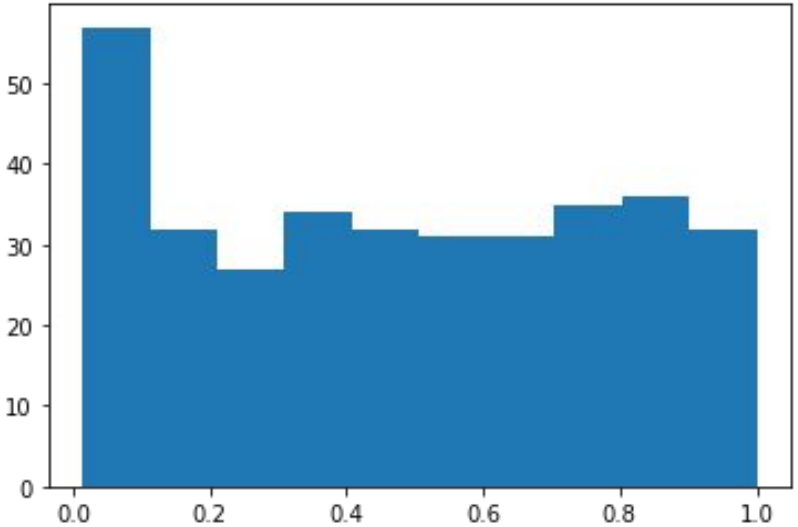
↓

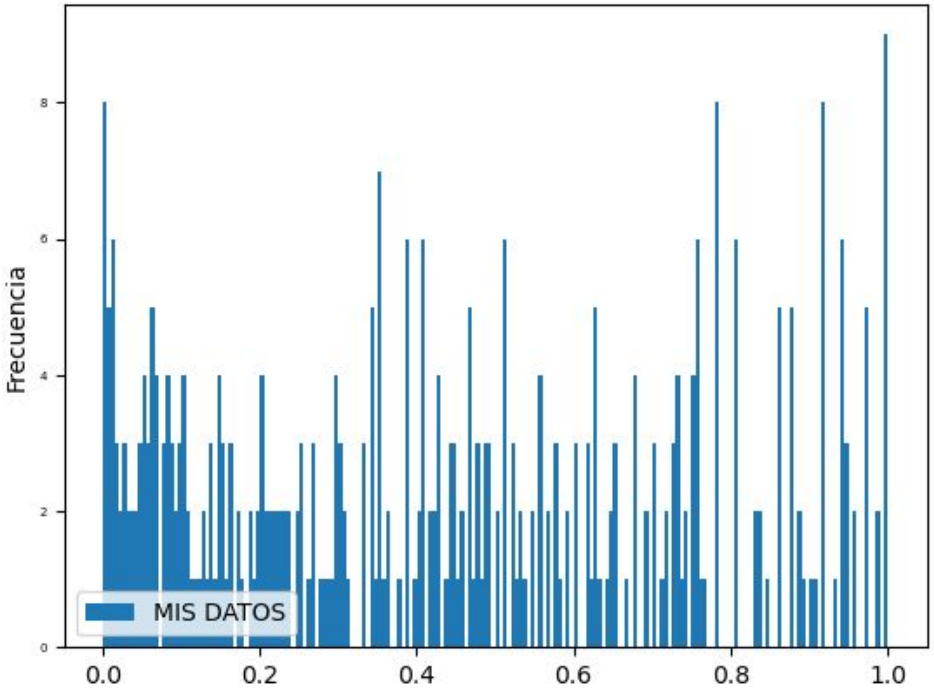
Frec. de muestreo

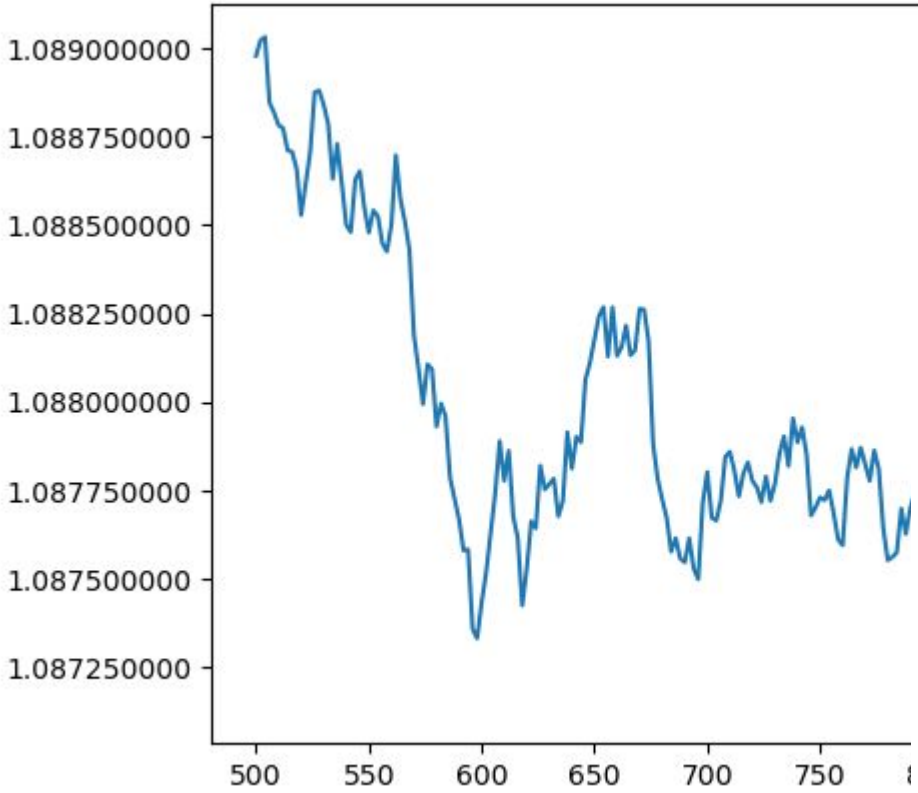
↓

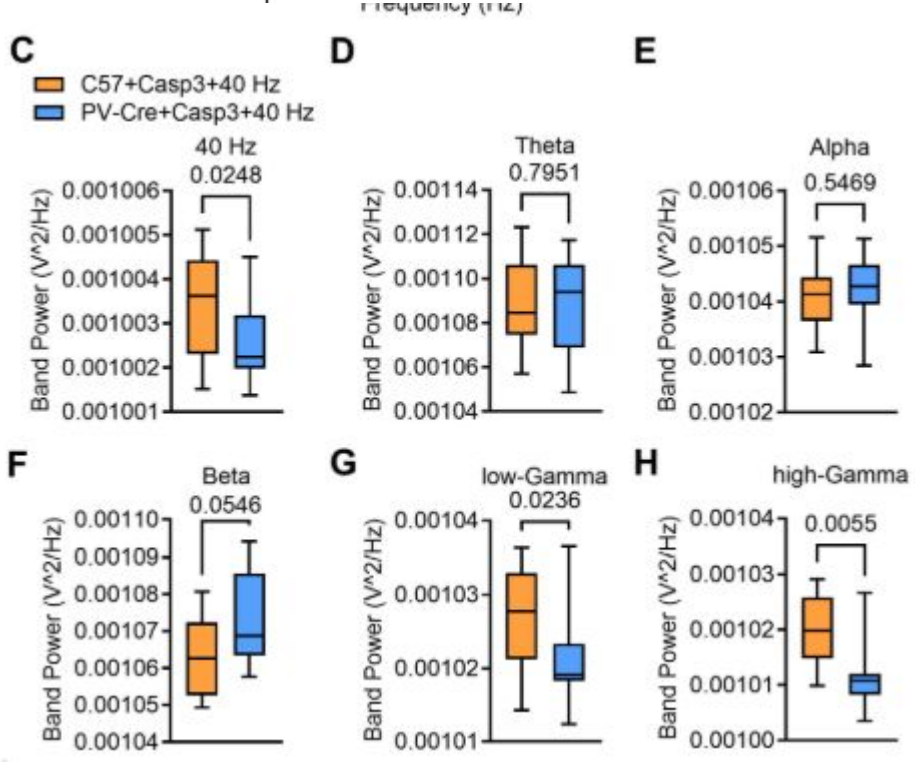
0

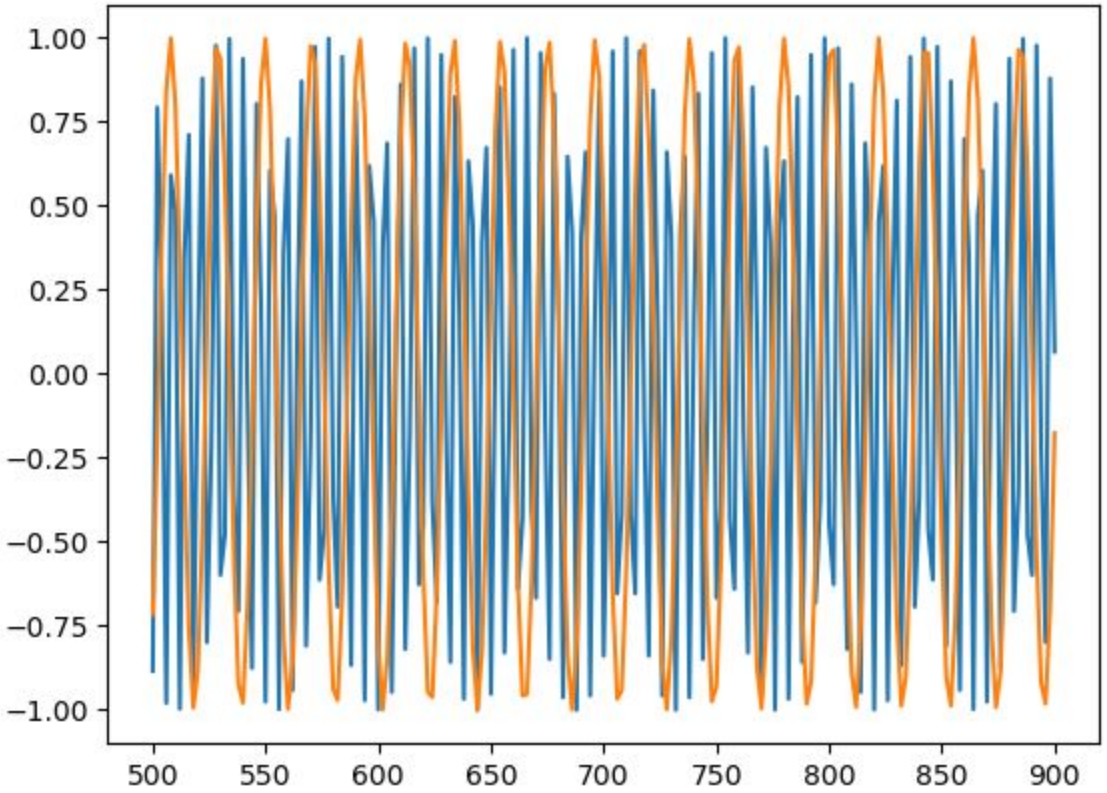

LET'S
PLAY

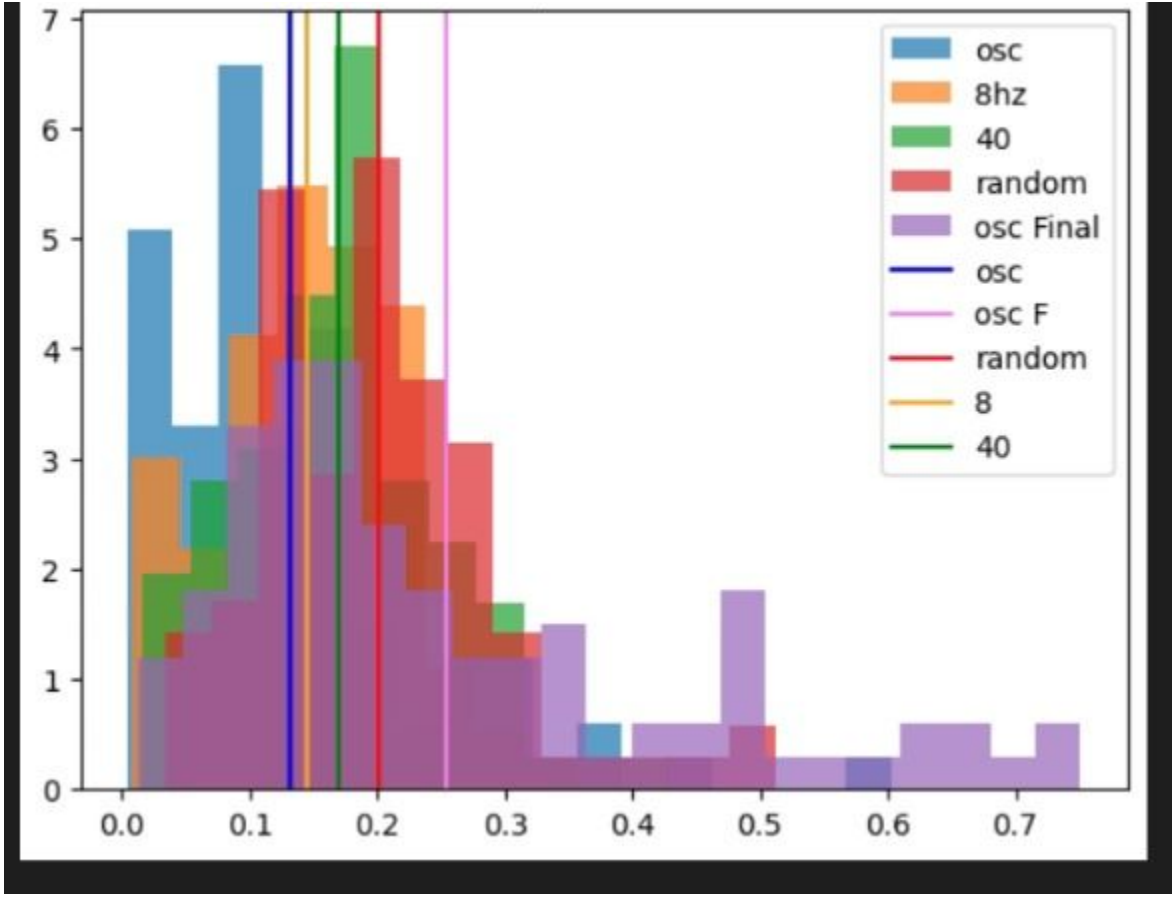

50
40
30
20
10
0
0.0
0.2
0.4
0.6
0.8
1.0

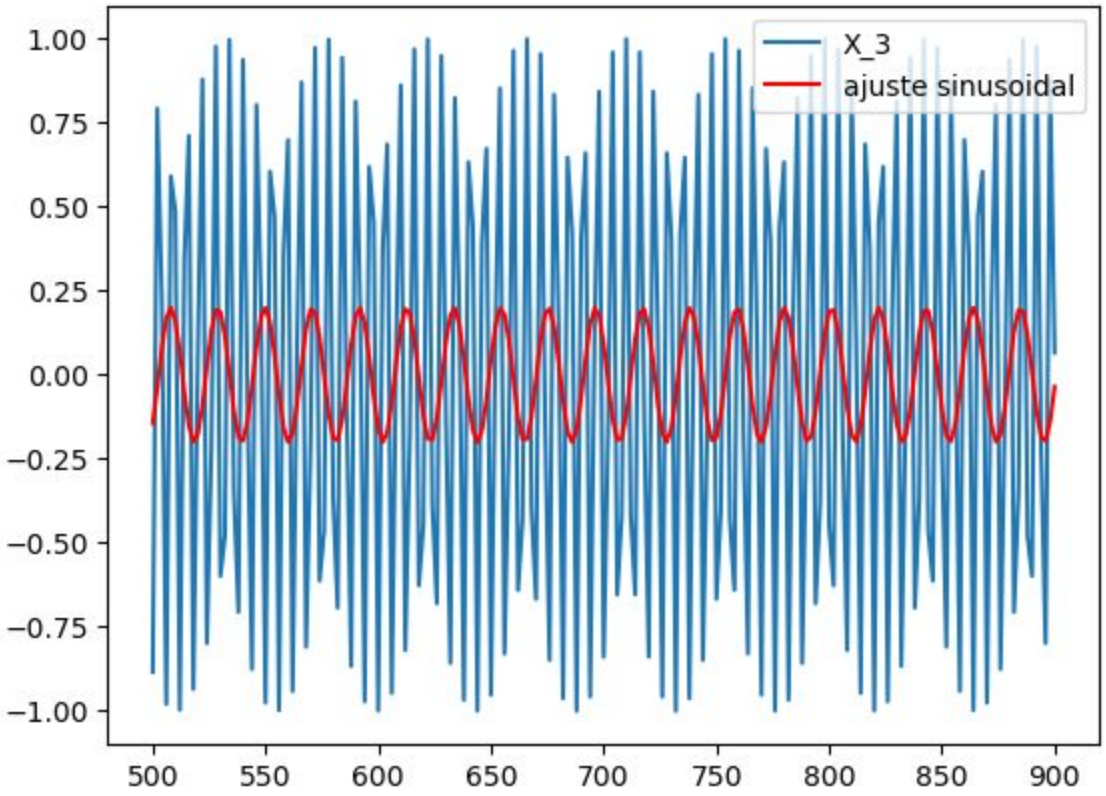

Frecuencia
8
6
4
2
0
MIS DATOS
0.0
0.2
0.4
0.6
0.8
1.0

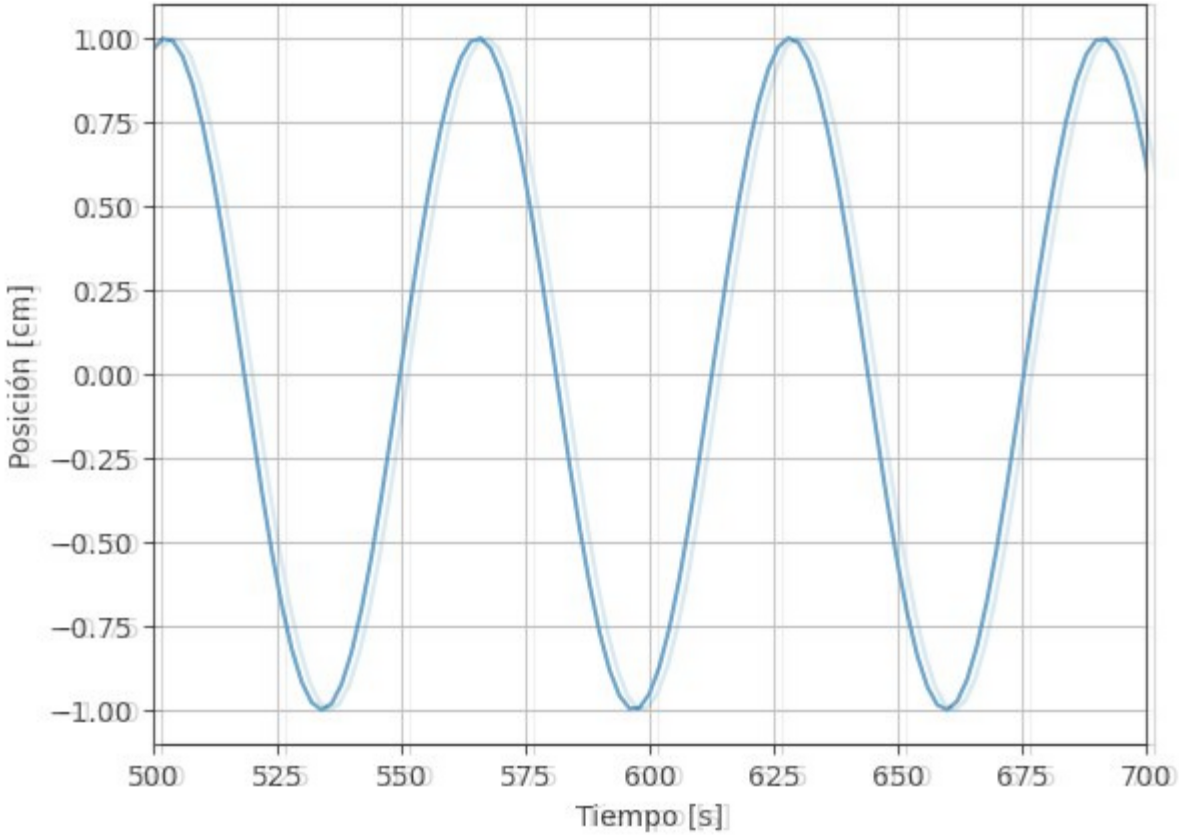

1.089000000
1.088750000
1.088500000
1.088250000
1.088000000
1.087750000
1.087500000
1.087250000
500
550
600
650
700
750

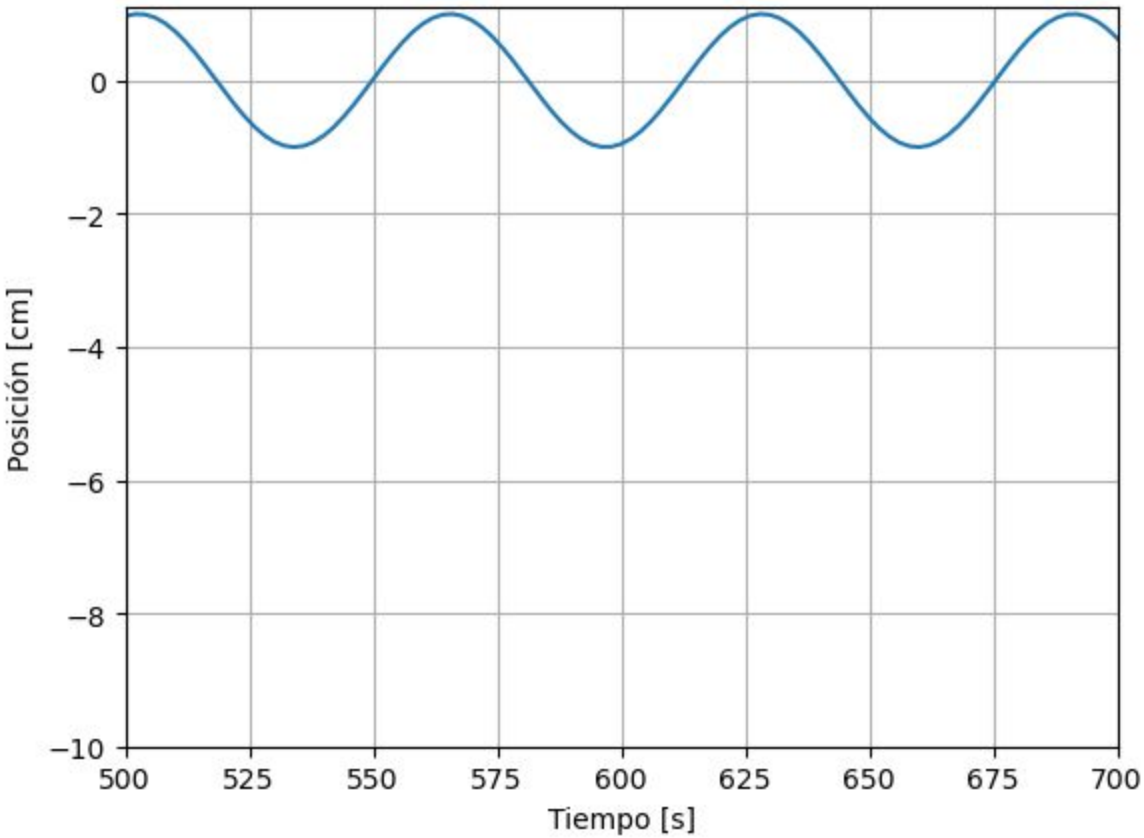

C
C57+Casp3+40 Hz
PV-Cre+Casp3+40 Hz
40 Hz
0.0248
Band Power (V^2/Hz)
D
Theta
0.7951
E
Alpha
0.5469
F
Beta
0.0546
G
low-Gamma
0.0236
H
high-Gamma
0.0055

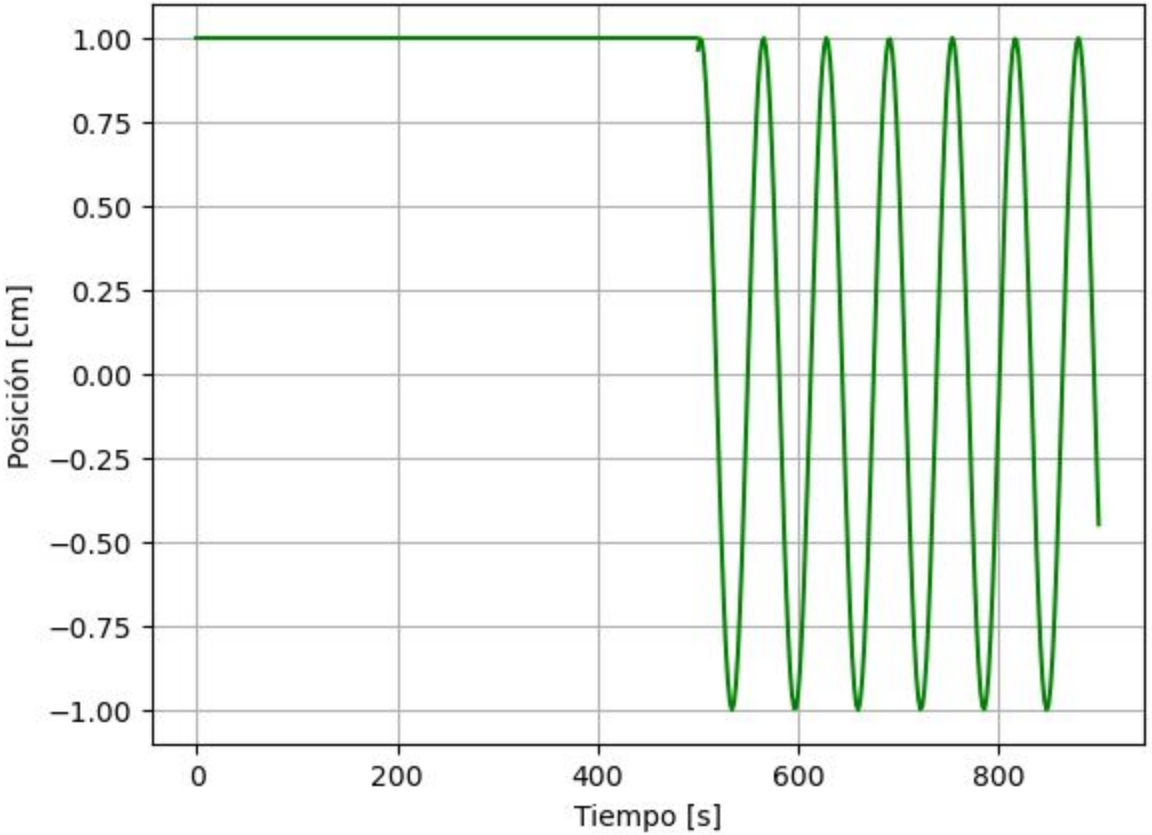

1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
500
550
600
650
700
750
800
850
900


osc
8hz
40
random
osc Final
osc
osc F
random
8
40
0
1
2
3
4
5
6
7
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7


X_3
ajuste sinusoidal
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
500
550
600
650
700
750
800
850
900


1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
Posición [cm]
500
525
550
575
600
625
650
675
700
Tiempo [s]


0
−2
−4
−6
−8
−10
Posición [cm]
500
525
550
575
600
625
650
675
700
Tiempo [s]



¿que quiero decir?
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