

¿Cerca o lejos?

Cómo medimos distancias en el Universo

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Instituto de Astrofísica de Canarias

Un fisquito de Matemáticas



EXCELENCIA
SEVERO
OCHOA



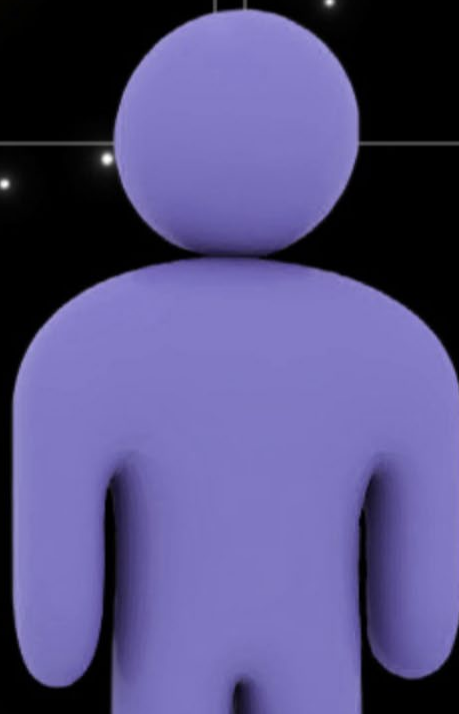
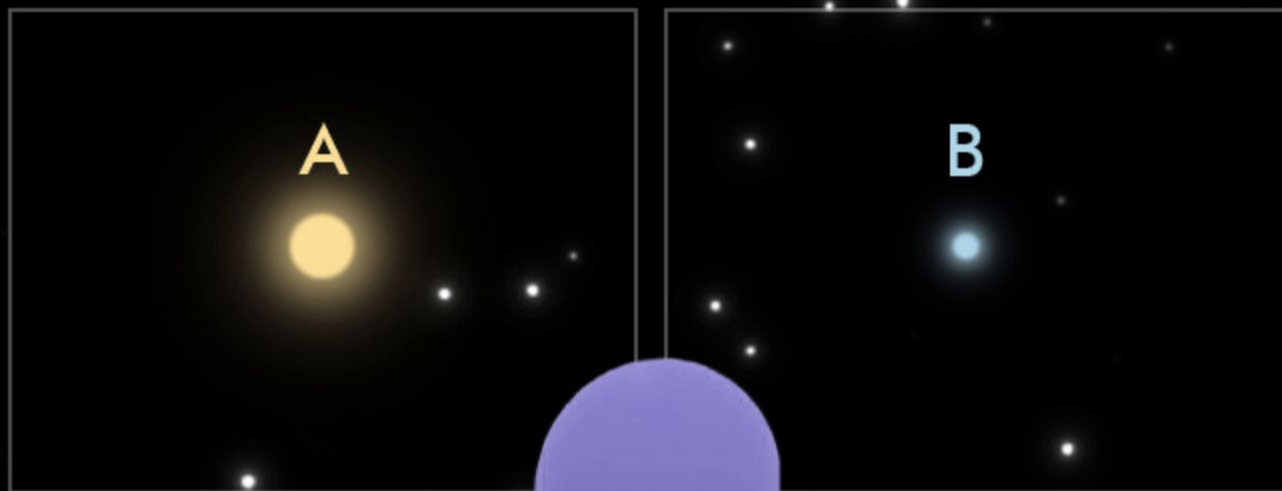
¿Cerca o lejos?



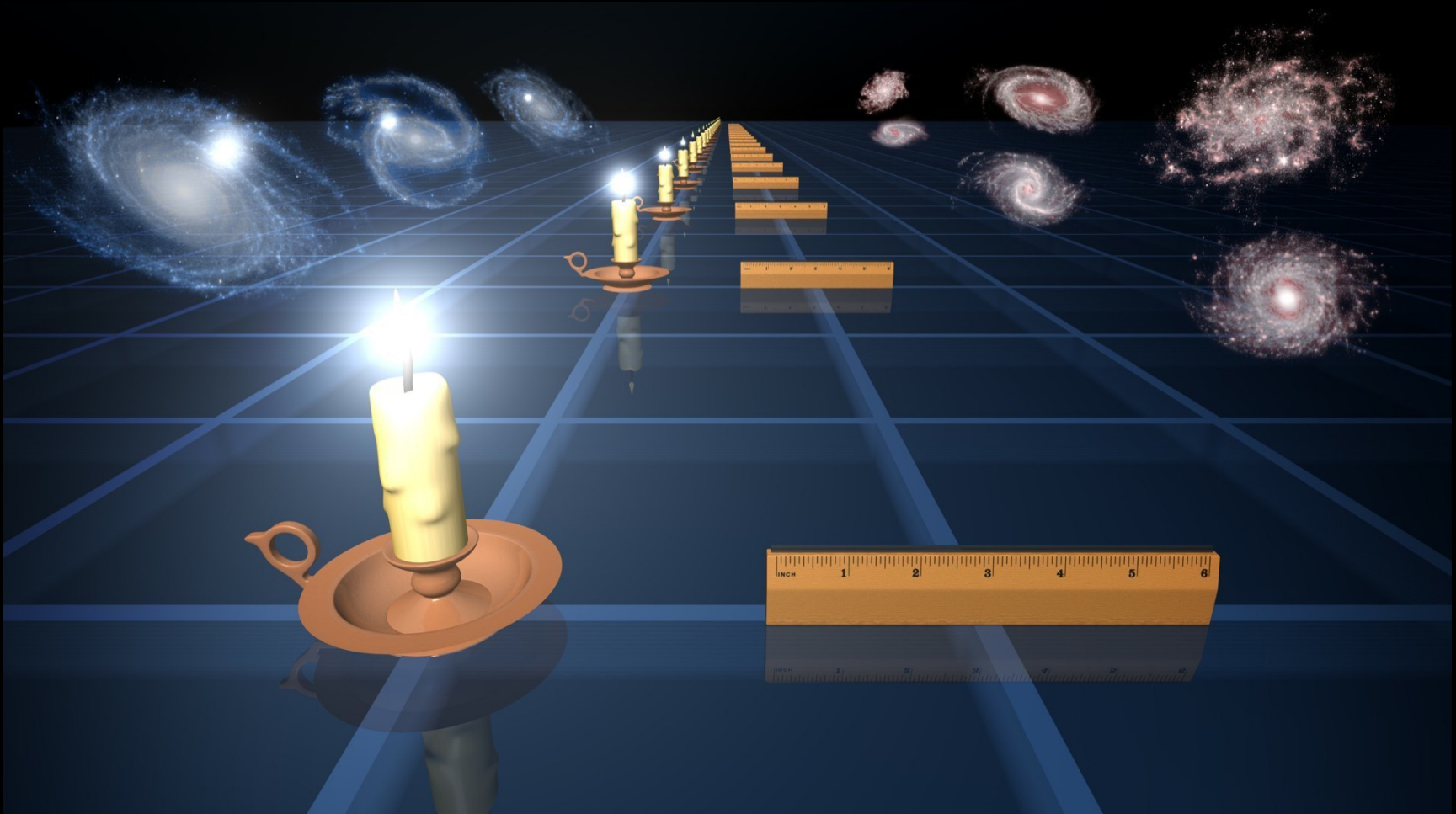
¿Cerca o lejos?



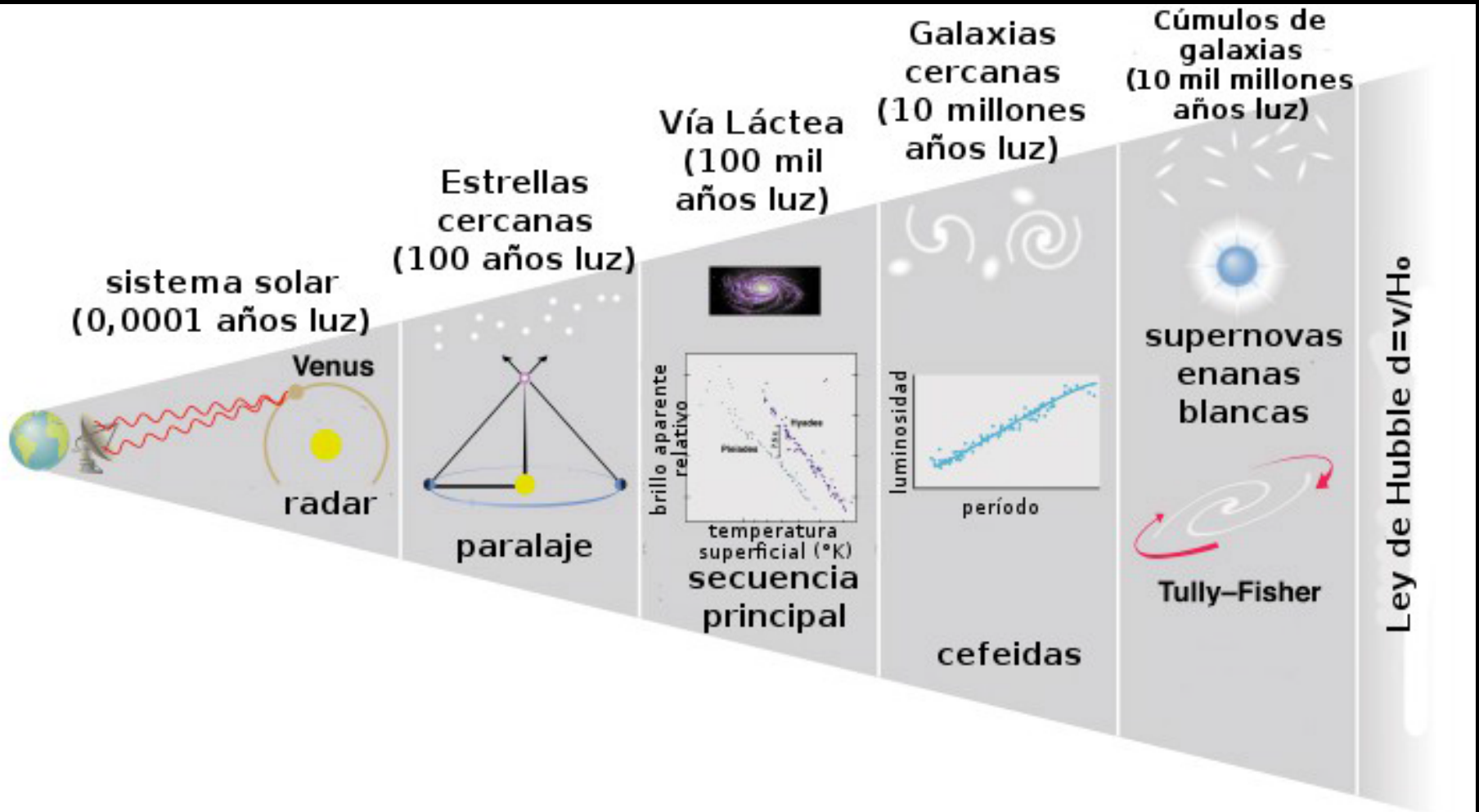
¿Cerca o lejos?



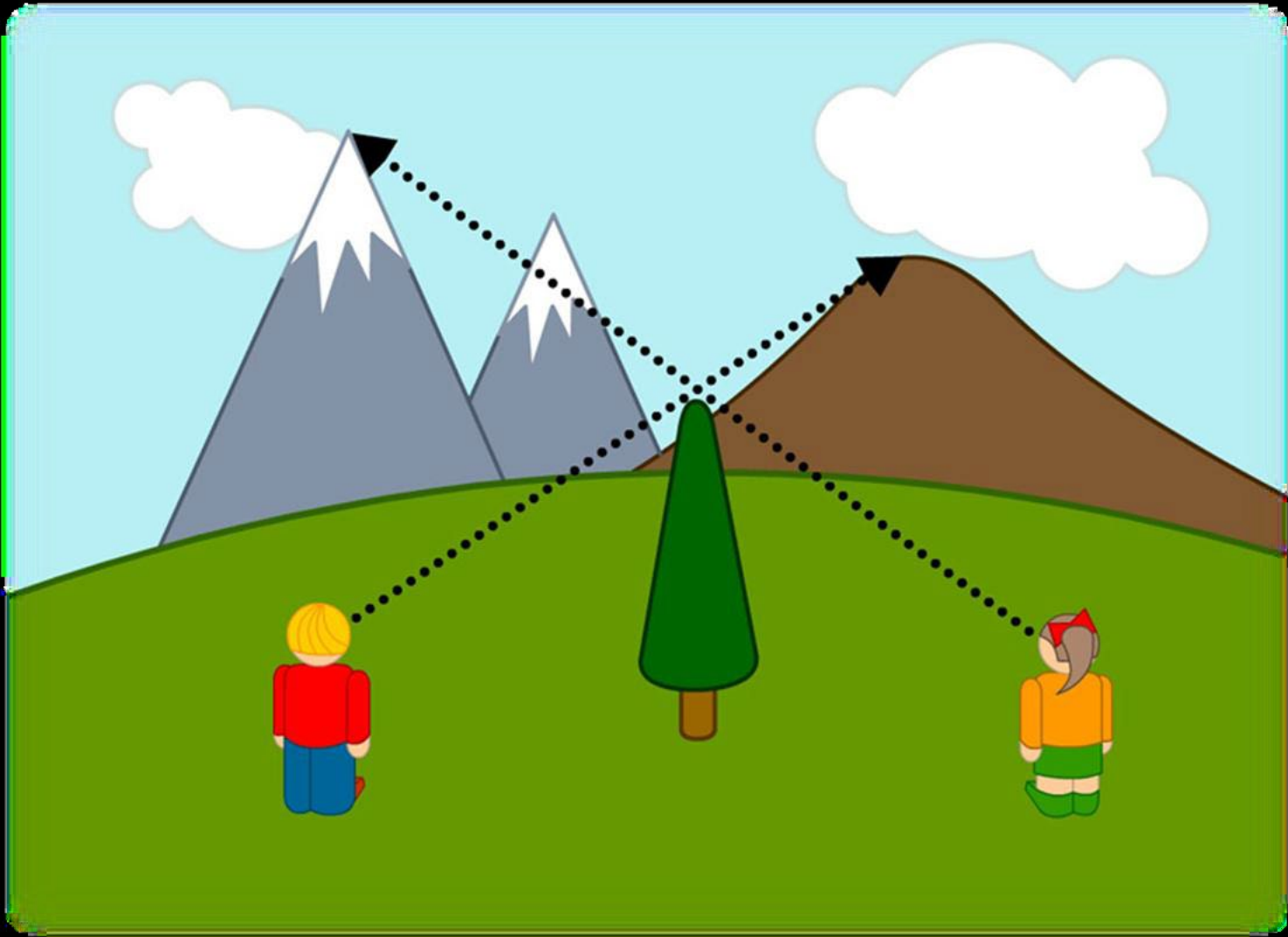
Flujo y Luminosidad



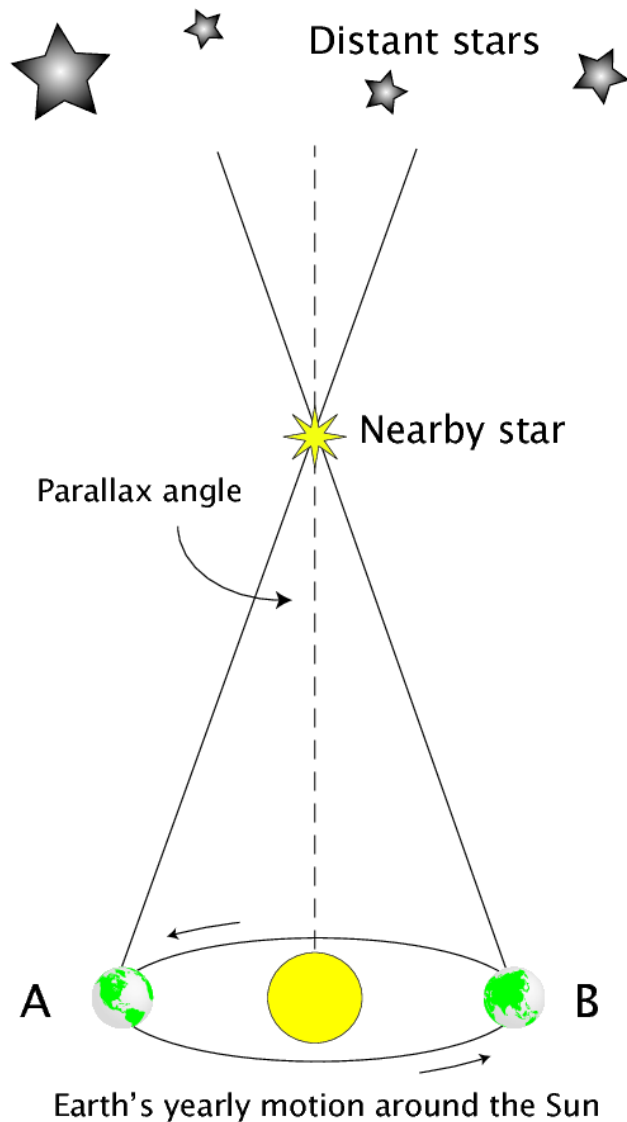
Escalera de Distancias



Paralaje



Paralaje



$$d \text{ (pc)} = 1 / p \text{ (")}$$

d = distancia a la estrella
en pársecs

p = ángulo de paralaje
en segundos de arco



Próxima Centauri:

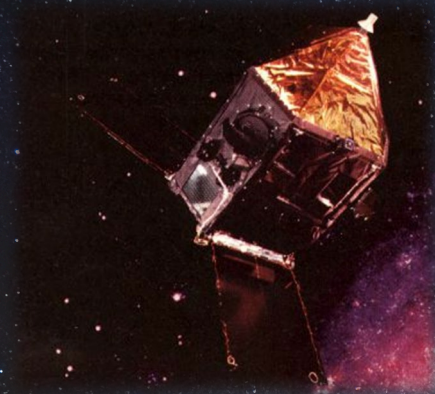
$$p = 0.76''$$

$$\rightarrow d = 1 / 0''.76 = 1.31 \text{ pc}$$

Paralaje

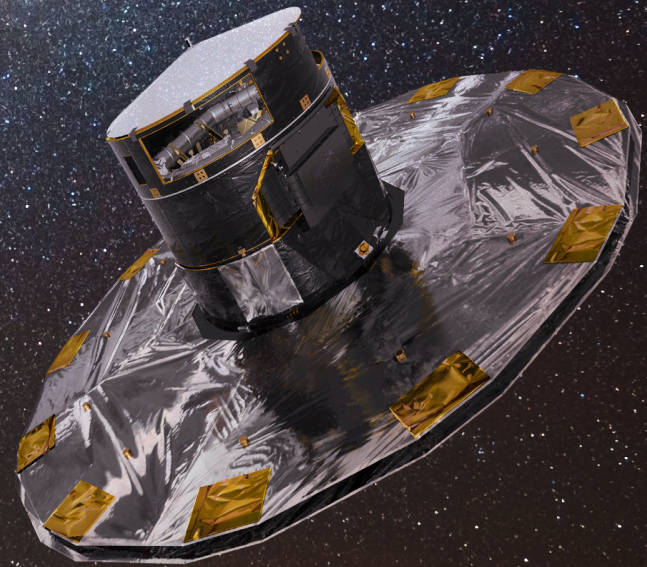
Satélite Hipparcos (ESA)

$p < 200 \text{ pc}$

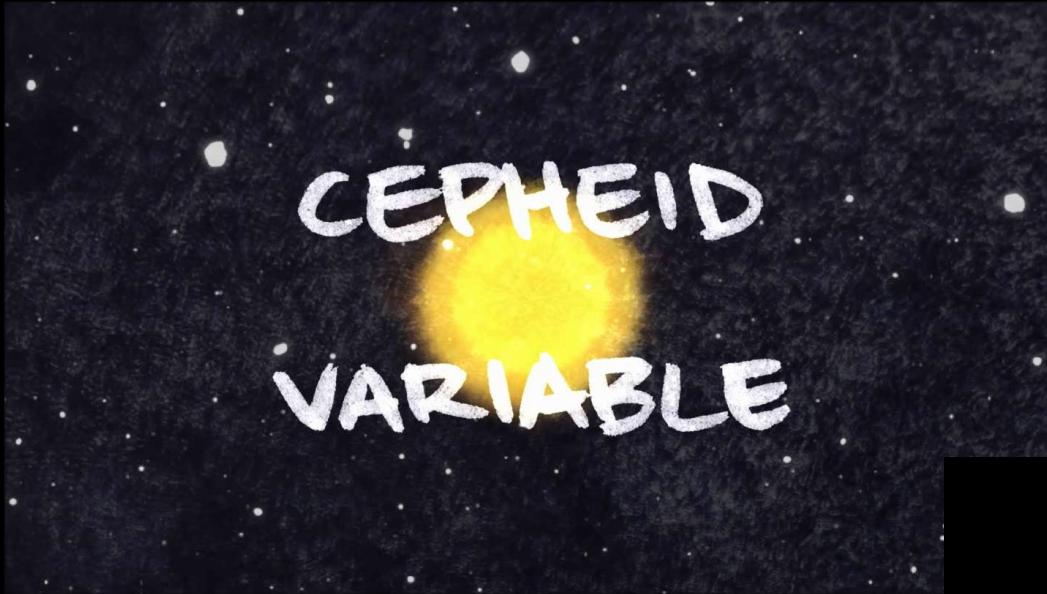


Misión GAIA (ESA)

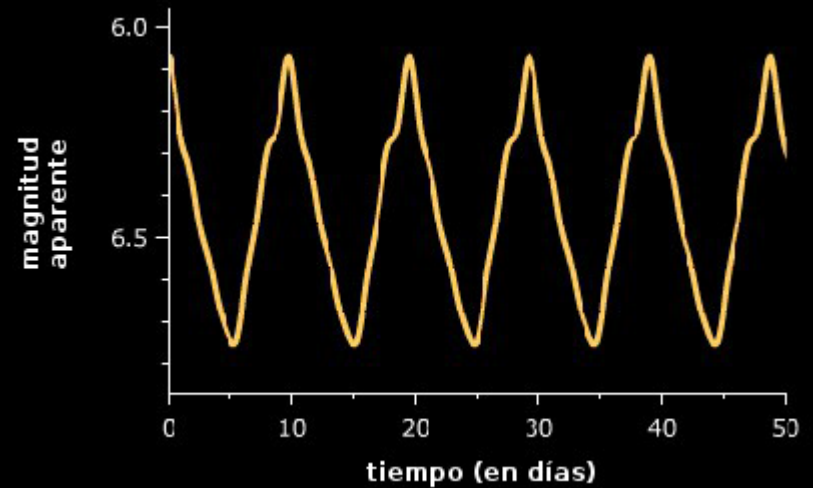
$p < 10.000 \text{ pc}$



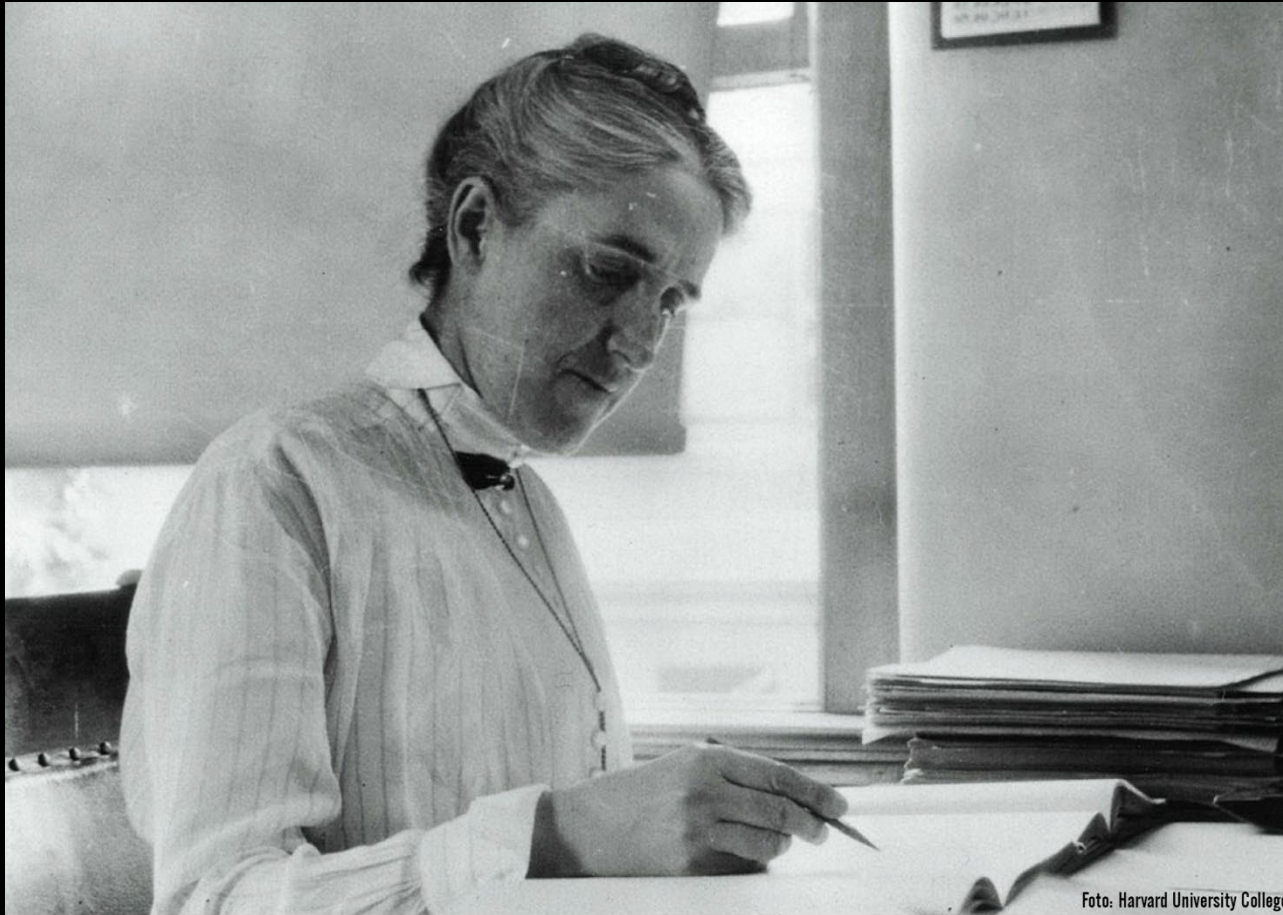
Candelas estándar



Cefeidas



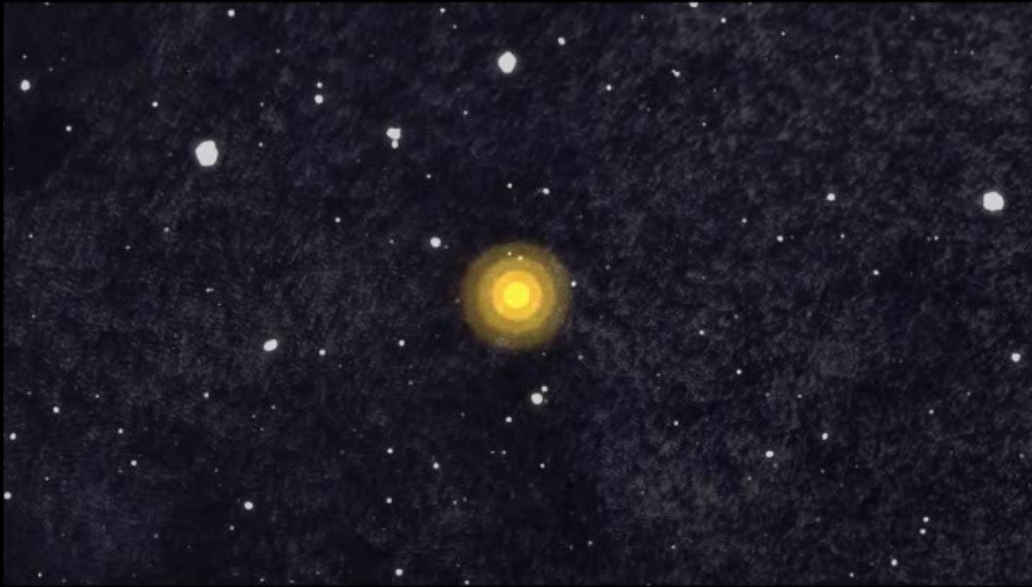
Cefeidas



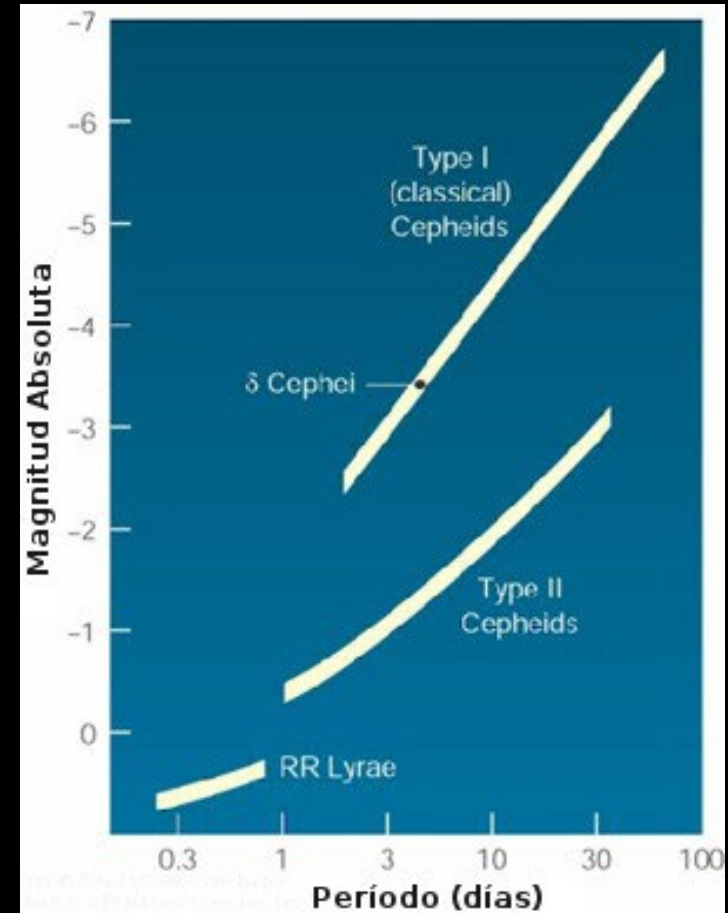
Henrietta Leavitt
1912, Harvard College Observatory

Cefeidas

Relación entre período de pulsación y brillo intrínseco:
las Cefeidas MÁS BRILLANTES
tienen PERIODOS MÁS LARGOS



Cefeidas :1 kpc - 30 Mpc



$$m - M = -5 + 5 \log_{10}(d)$$

Henrietta Leavitt



Astónoma merecedora del premio Nobel