

Física 1 – Ciências Moleculares

Caetano R. Miranda

AULA 3 – 24/08/2023

crmiranda@usp.br



sampa



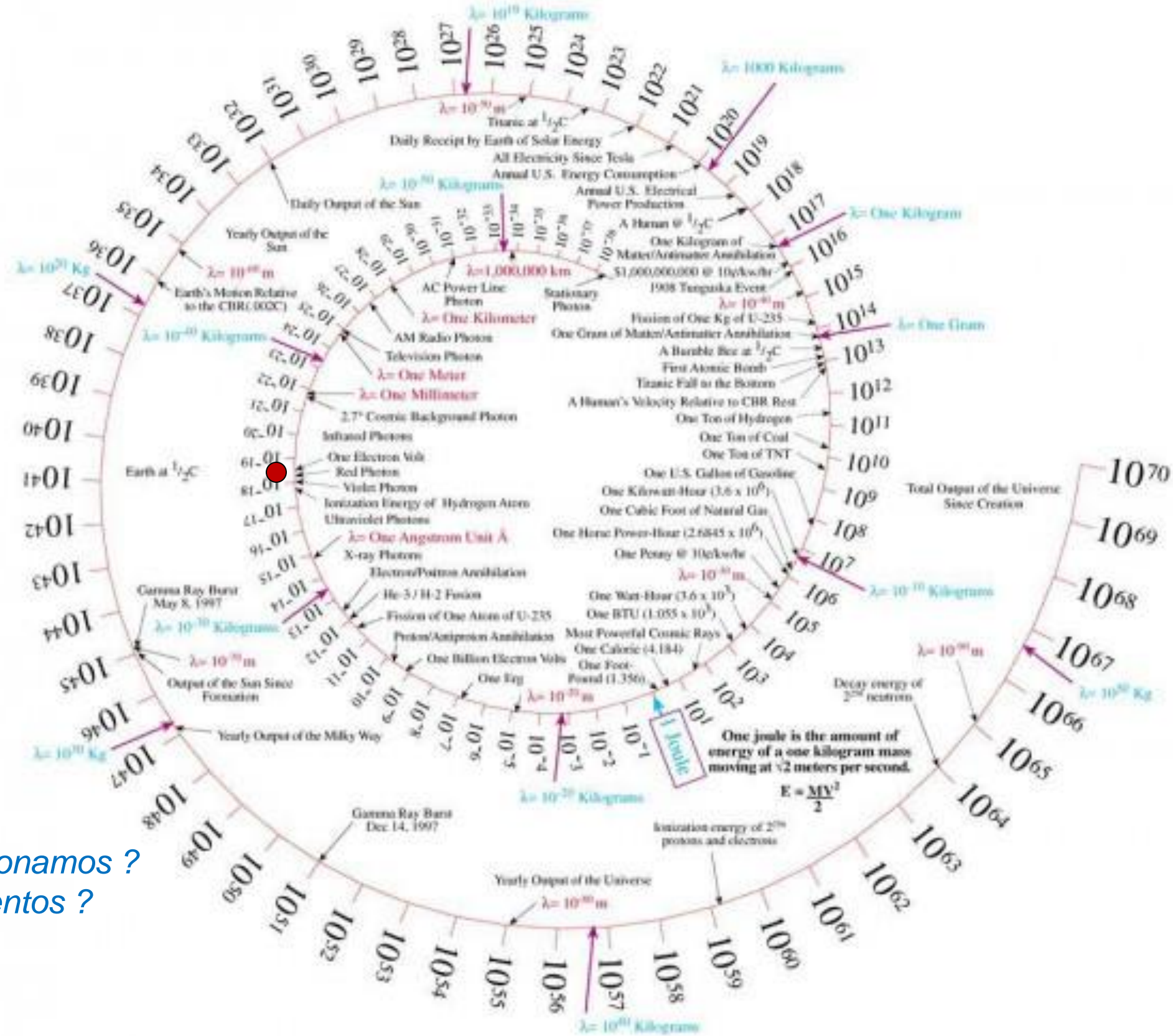
Chandrayaan-3



Roteiro – 24/08/2023

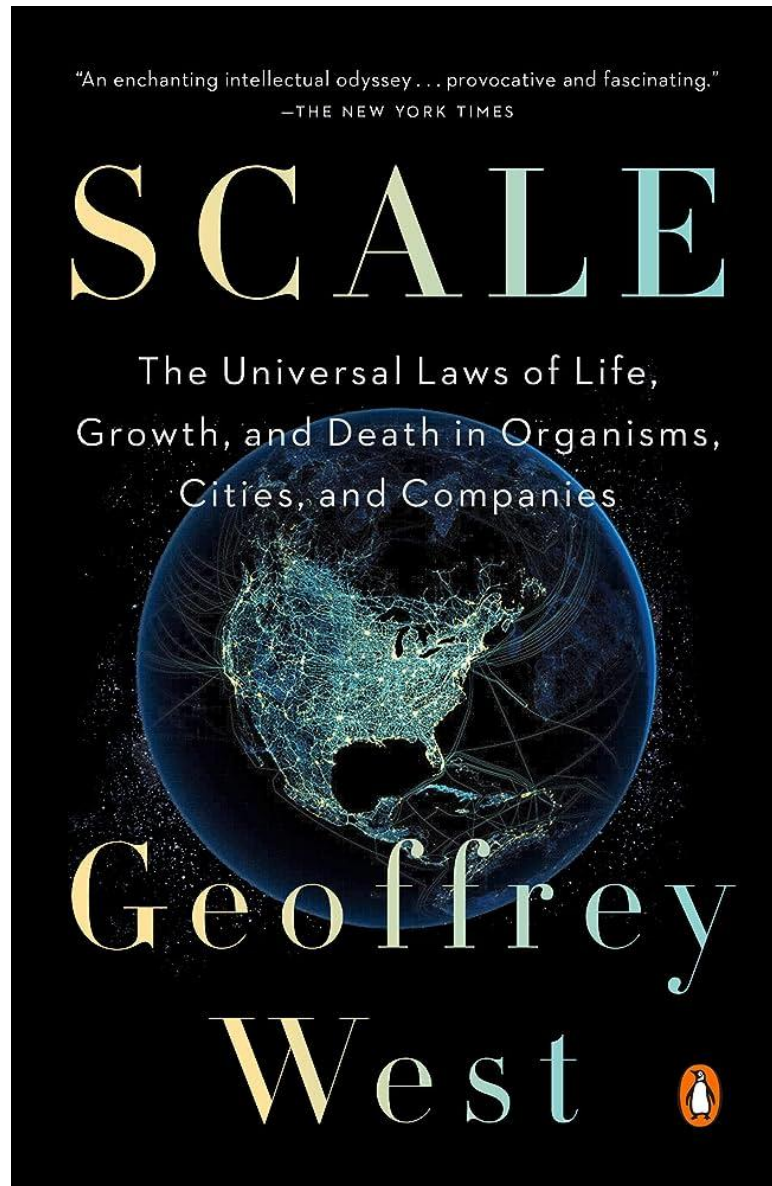
- Finalizar Tomadas de dados
- Análise dos dados
- VR - Escala – Nano
- VR – Escala – Astronômica

Escalas de energia

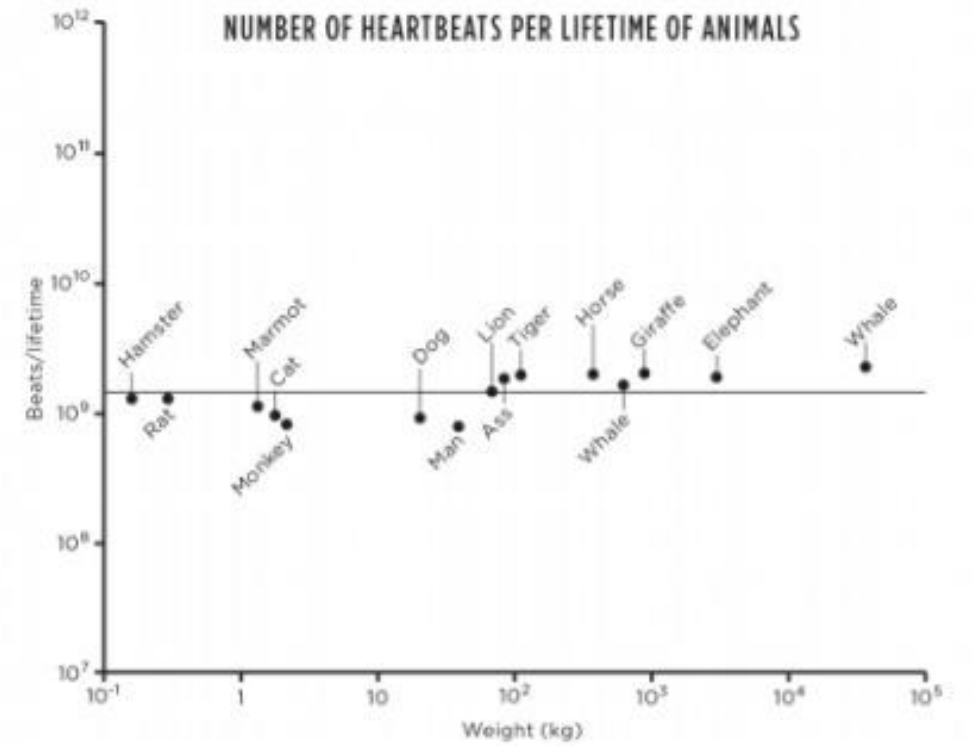
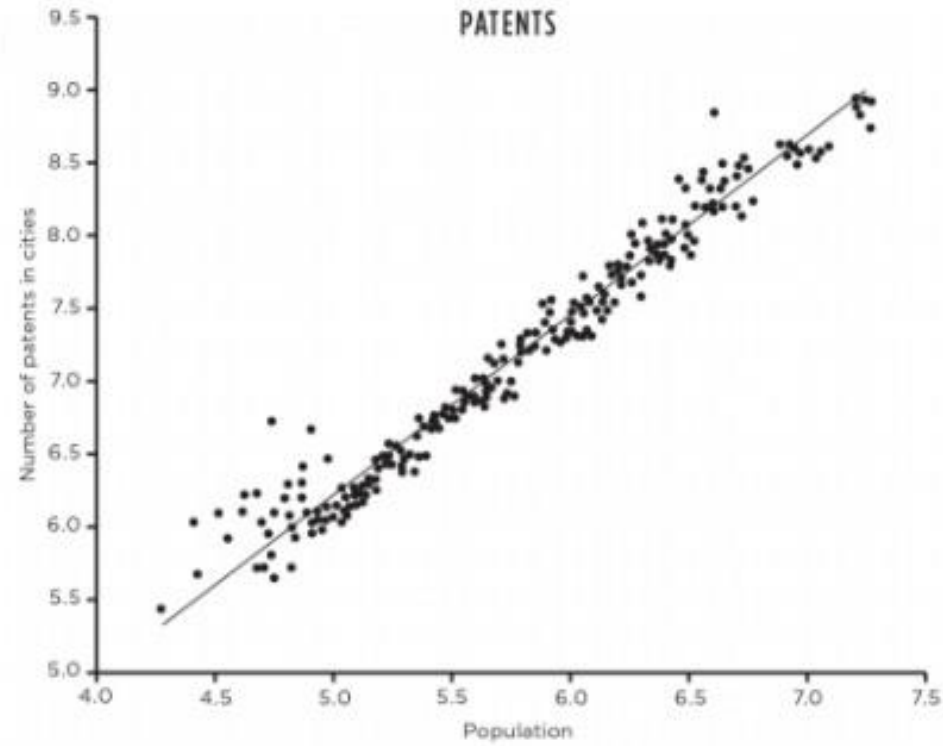
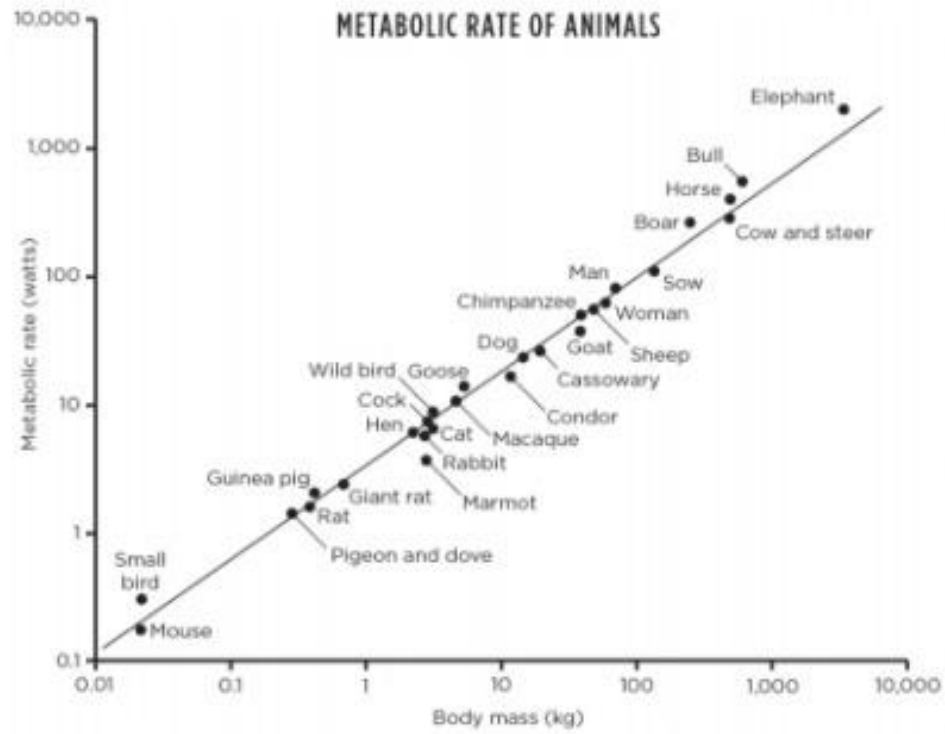


O que medimos (vemos e sentimos) ?
 Como classificamos, modelamos ou correlacionamos ?
 O que construímos a partir desses conhecimentos ?

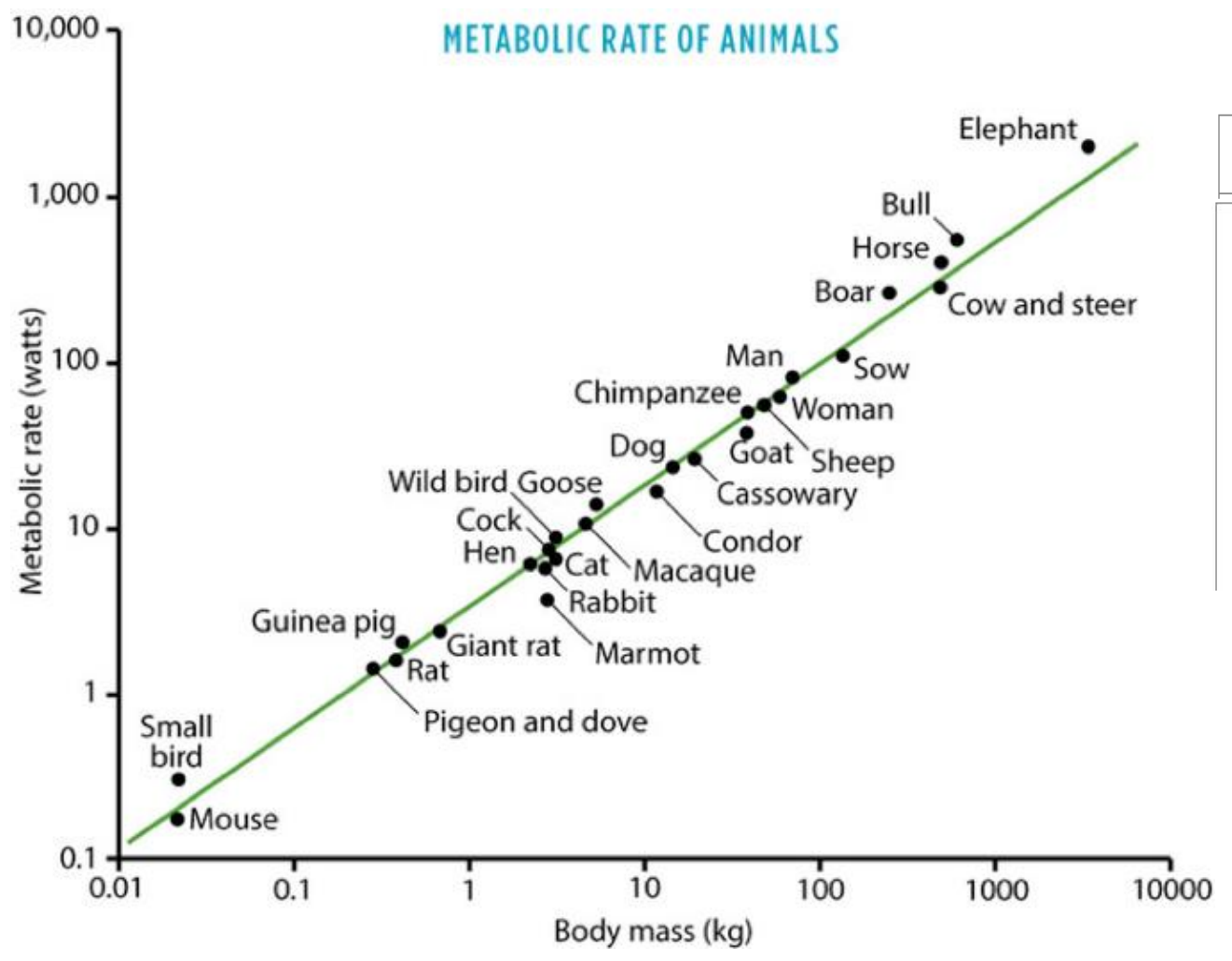
Sugestão de leitura



Escalas



METABOLIC RATE OF ANIMALS



$b > 1$	$0 < b \leq 1$	$b \leq 0$
<p>Metabolic Rate = $Size^b$</p> <p>Metabolic Rate vs Size</p>	<p>Metabolic Rate = $Size^{b=1/2} = \sqrt{Size}$</p> <p>Metabolic Rate vs Size</p>	<p>Metabolic Rate = $Size^0 = 1$ or $Size^{-b} = \frac{1}{Size^b}$</p> <p>Metabolic Rate vs Size</p>

Evolution of the Mobile Phone



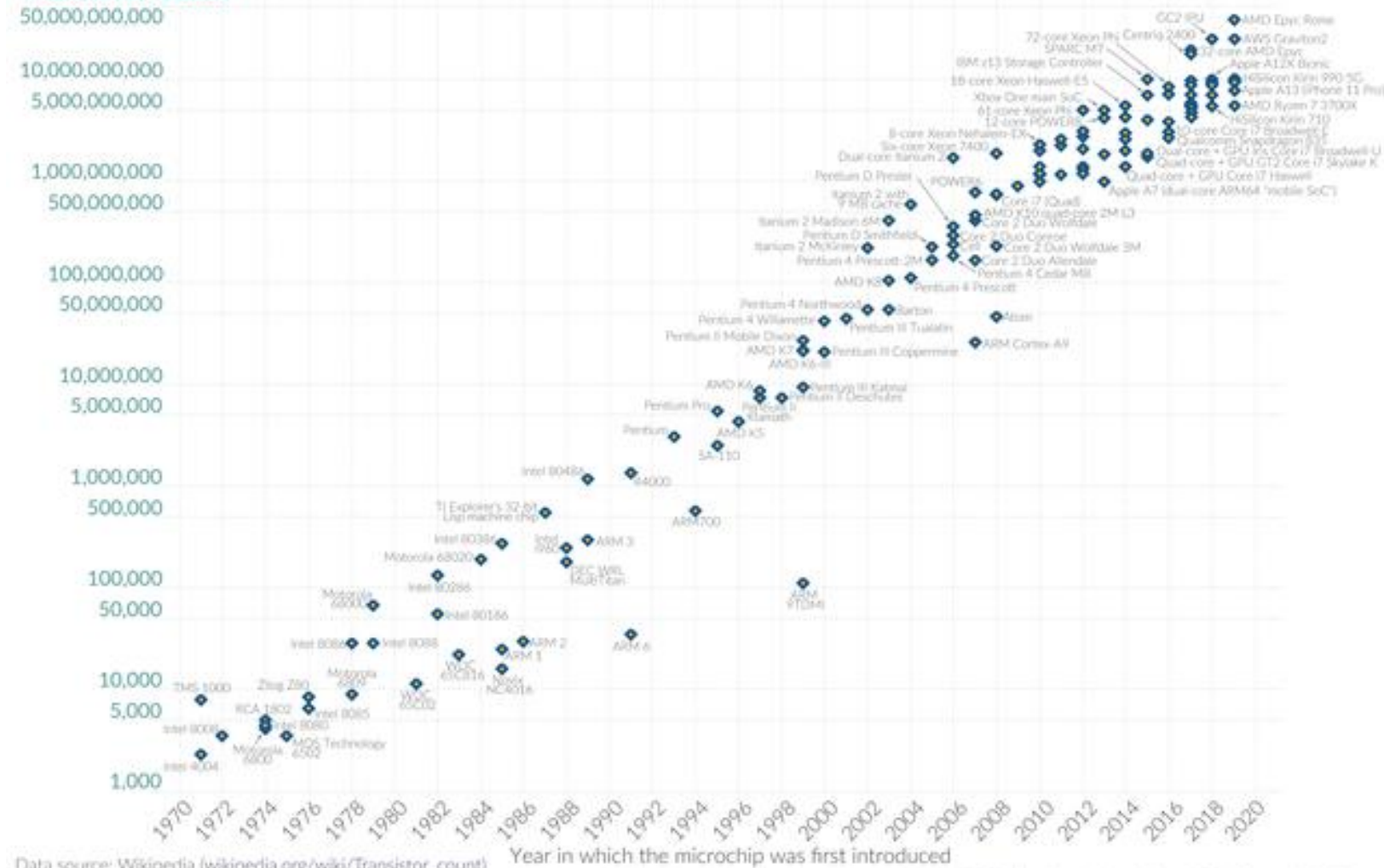
Lei de Moore

Moore's Law: The number of transistors on microchips doubles every two years



Moore's law describes the empirical regularity that the number of transistors on integrated circuits doubles approximately every two years. This advancement is important for other aspects of technological progress in computing – such as processing speed or the price of computers.

Transistor count



Data source: Wikipedia (wikipedia.org/wiki/Transistor_count)
 OurWorldinData.org - Research and data to make progress against the world's largest problems. Licensed under CC-BY by the authors Hannah Ritchie and Max Roser.



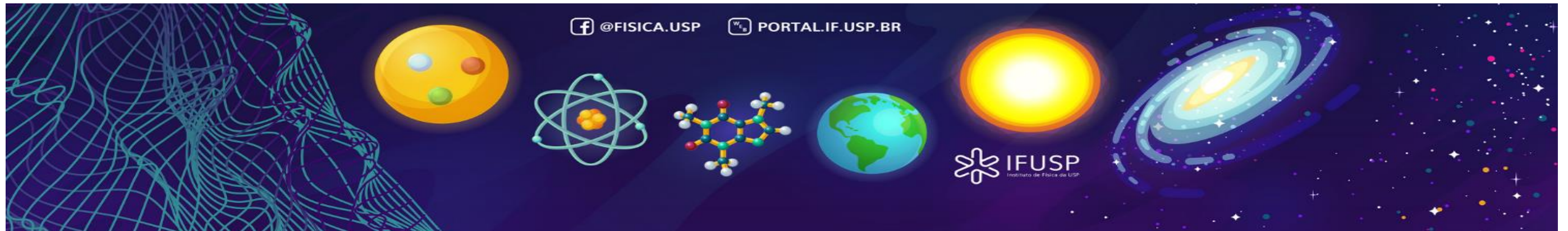
$$Y = aX^b$$
$$\log(Y) = \log(aX^b)$$

$$\log(Y) = b * \log(x) + \log(a)$$

The diagram illustrates the transformation of the power-law equation into its logarithmic form. It shows the following correspondences:

- Y (blue) maps to $\log(Y)$ (blue)
- b (red) maps to $b *$ (red)
- X (green) maps to $\log(x)$ (green)
- a (orange) maps to $\log(a)$ (orange)

Ciência Perceptiva



- ▣ A ideia é vivenciar escalas muito distintas da que vivemos no dia-dia
 - ▣ Percepção do mundo em distintas escalas
 - ▣ Criar uma intuição física sobre os fenômenos, a forma, tamanhos, espaço e processos dinâmicos nessa escala.
-

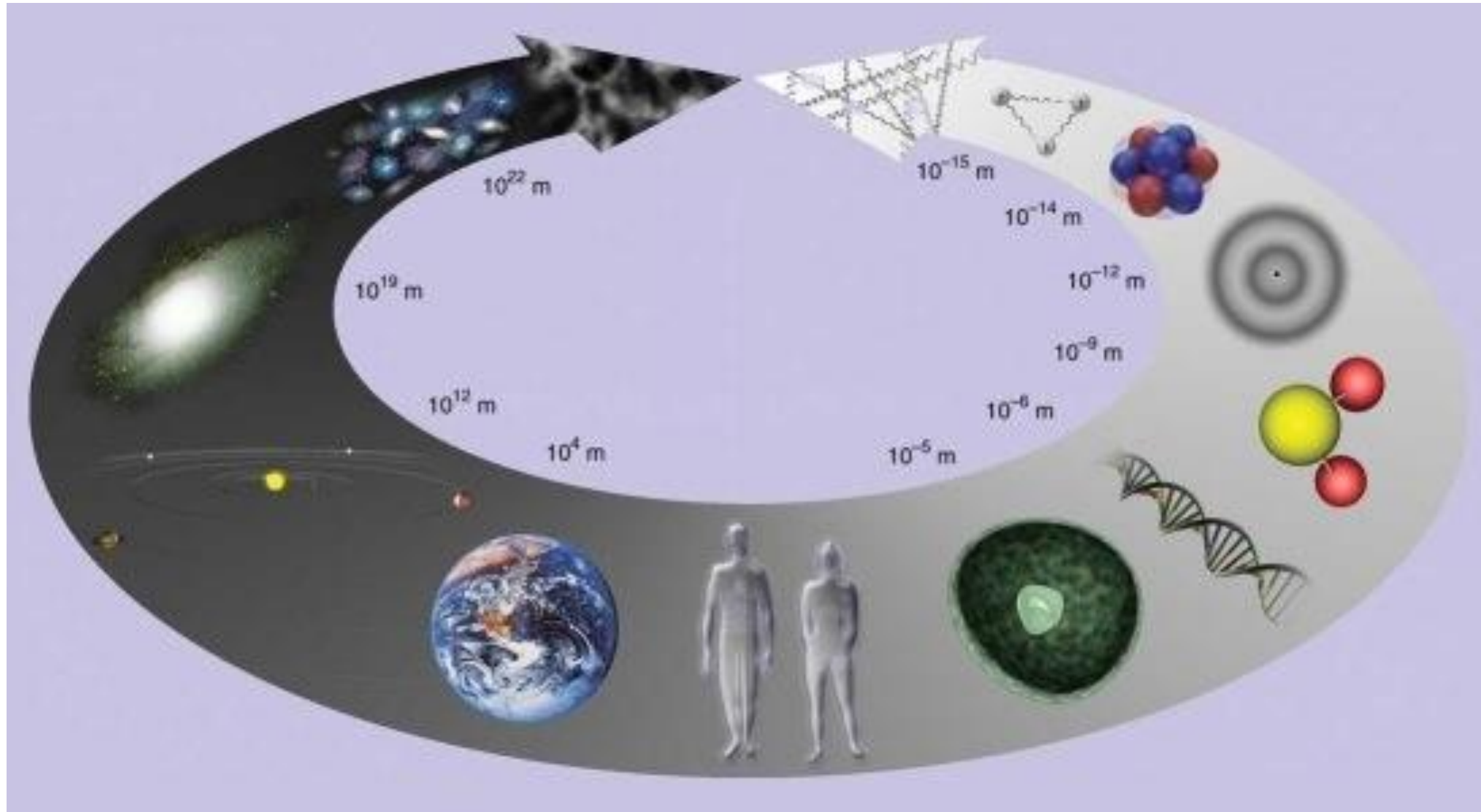
Objetivos

A ideia é vivenciar escalas muito distintas da que vivemos cotidianamente

Percepção do mundo em escala nano a astronômico

Criar uma intuição física sobre os fenômenos, a forma, tamanhos, espaço e processos dinâmicos nessa escala.

Escalas espaciais



Chegando ao mundo nano ...

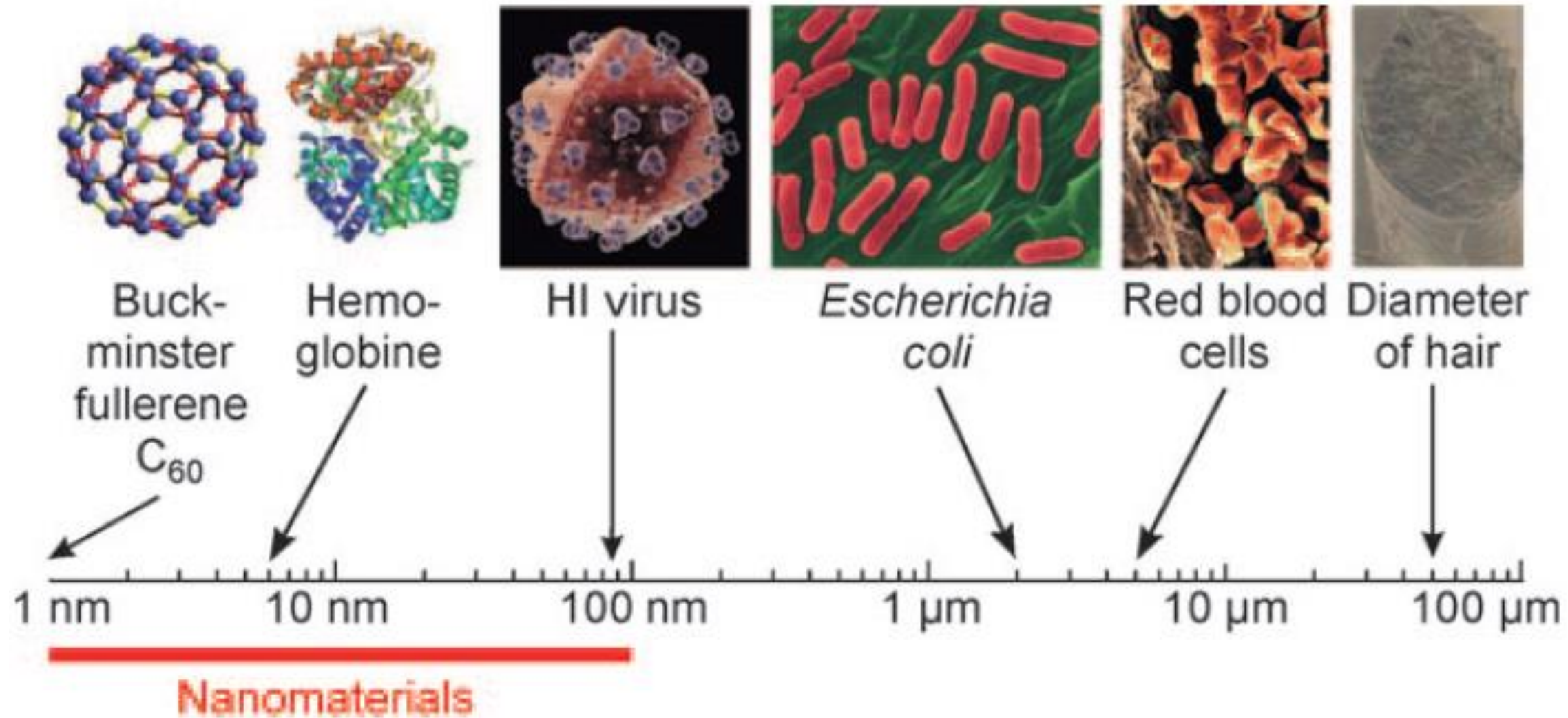
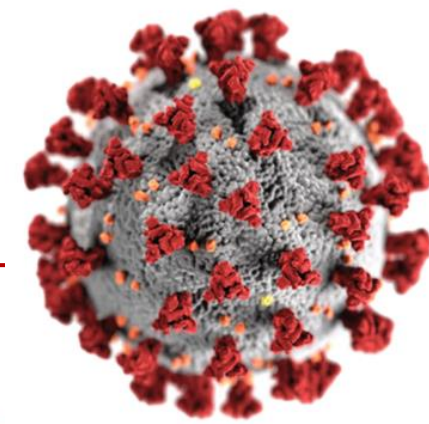
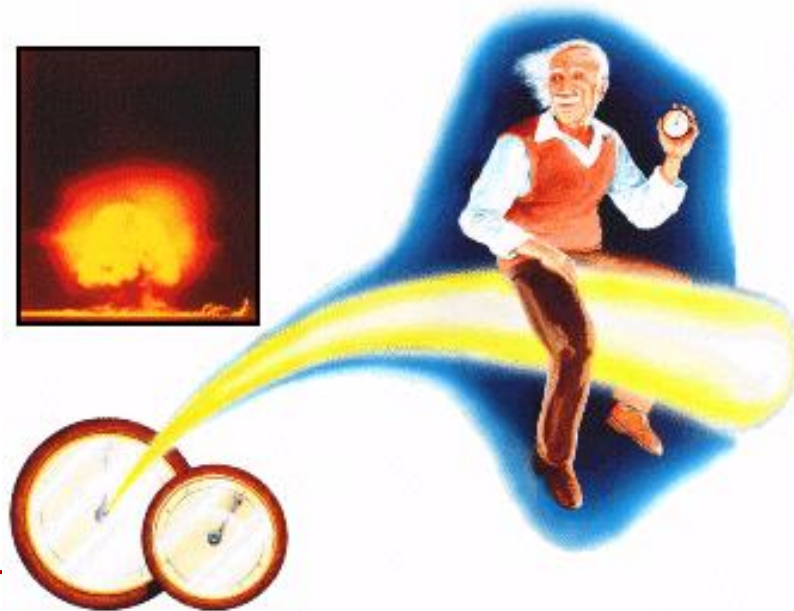
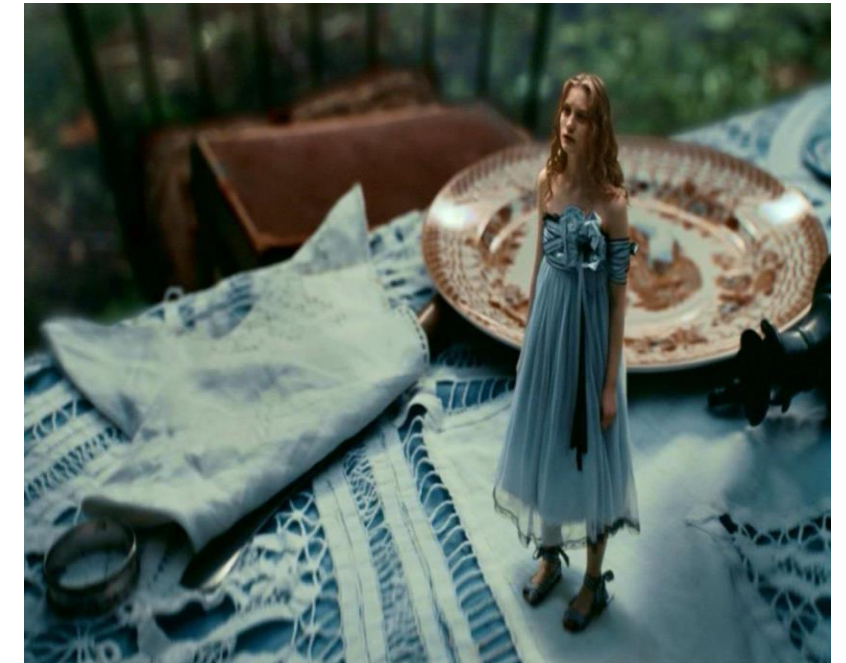
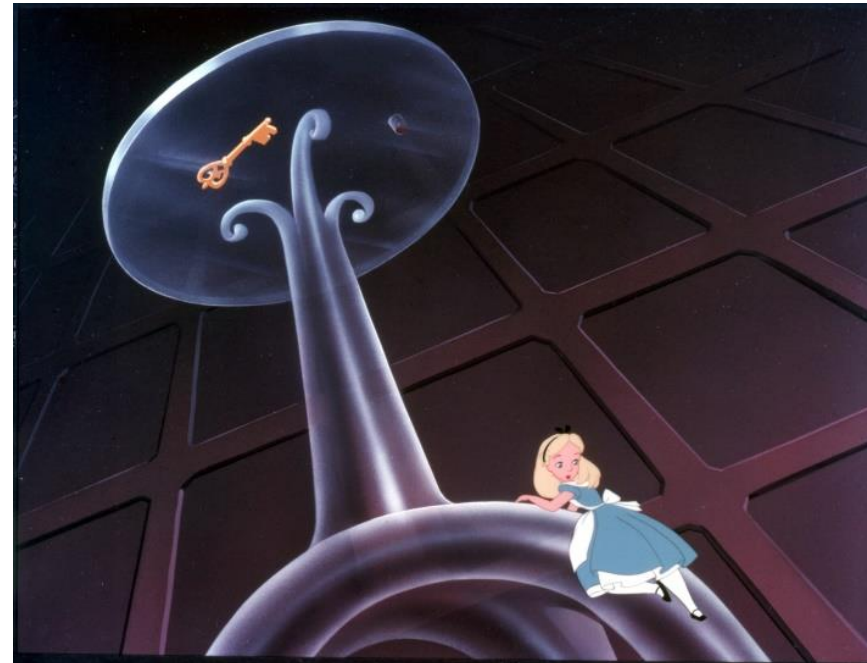


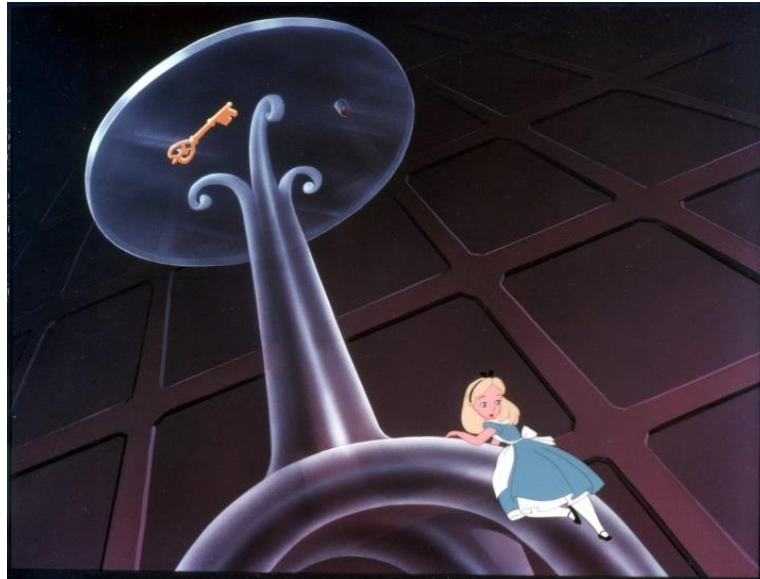
Figure 1. Length scale for classifying nanoparticles.

Experiências imersivas em escalas: Imagine se ... encolhêssemos... milhões de vezes

“thought experiments”



Experiências imersivas em escalas: Imagine se ... encolhêssemos... milhões de vezes

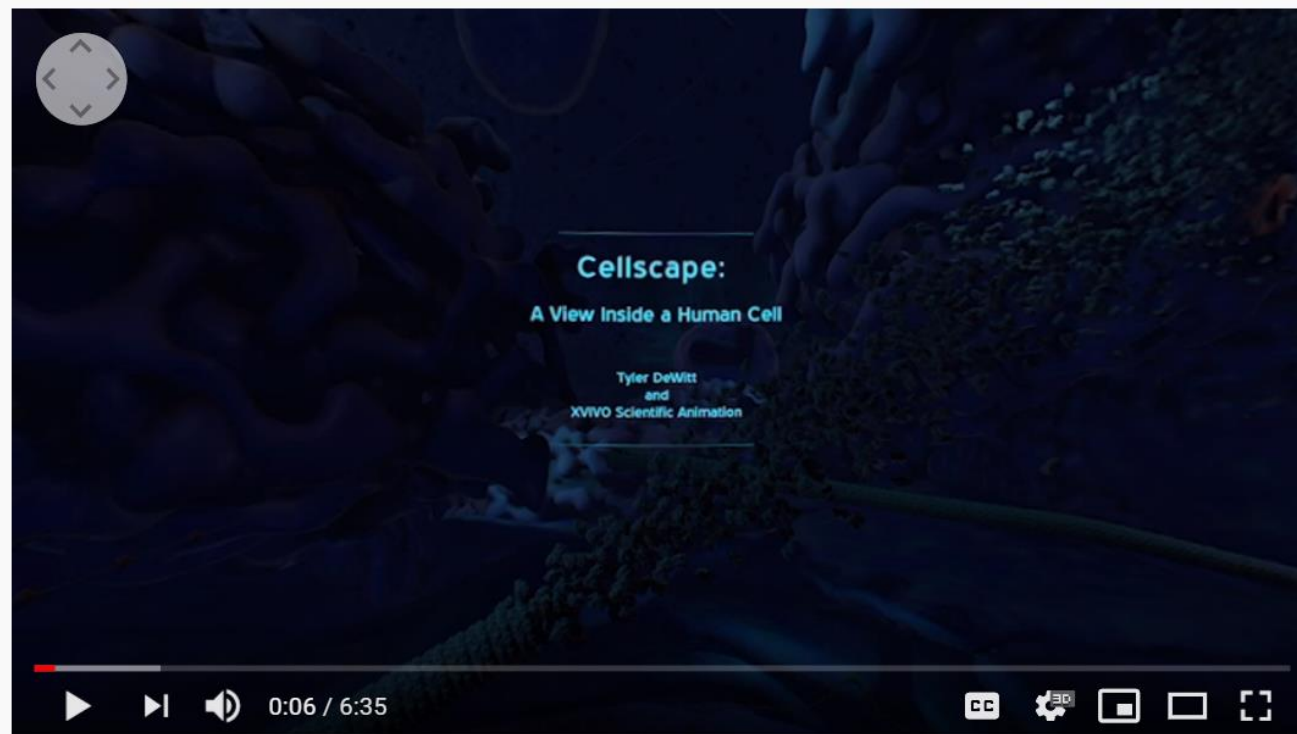
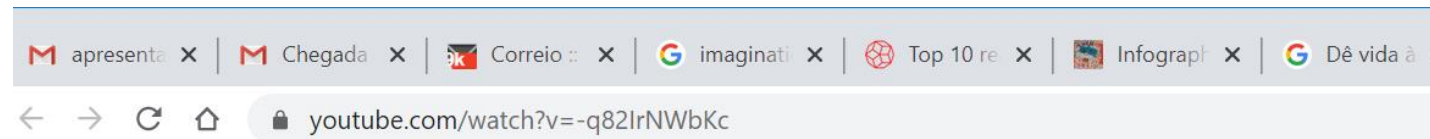


- **Exploração perceptiva:** experimentar sistemas físicos (de átomos a galáxias) na mesma escala que a nossa percepção física.

- Interagir e sentir o mundo em uma determinada escala (**nano ou astronômica**)
- Desenvolver uma intuição nessa escala (**fenômenos, forma, tamanhos, espaço e processos dinâmicos**)



Jornada à celula humana

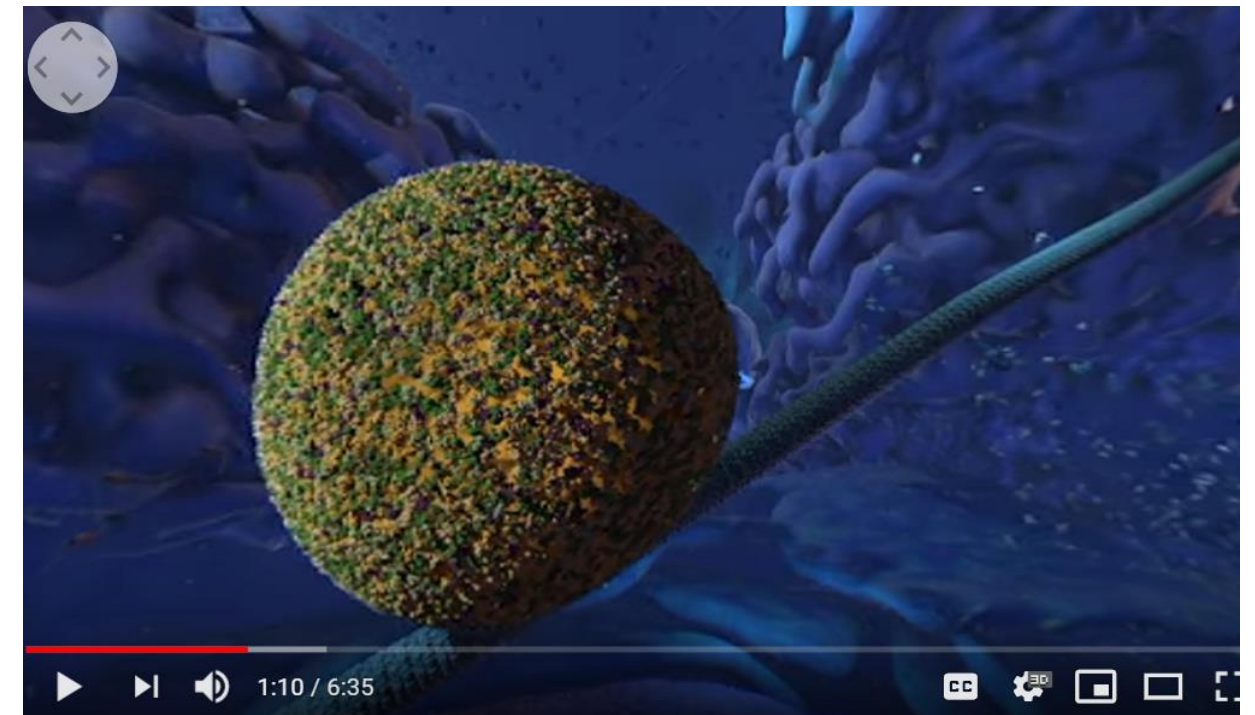


Cellscape VR Biology Guided Tour

144,098 views • Jul 17, 2017

1.7K 51 SHARE SAVE ...

<https://www.youtube.com/watch?v=-q82lrNWbKc>



Tour em realidade virtual por Plutão e/ou exoplanetas



https://www.youtube.com/watch?v=jlXQXGTI_mo



<https://www.youtube.com/watch?v=qhLExhpXX0E>

Sumário – 24/08/2023

- Escalas

Devolutiva:

- Como foi a aula hoje ? (Moodle)

<https://forms.gle/5z6tQvuFoNgwiF4s8>

