

## Physics 102 - January 27, 2014

- Class / Assignment / Recitation issues?
- Nova multiverse documentary

# The Human Experience

$$\begin{aligned} 1 &= 10^0 \\ 10 &= 10^1 \\ 100 &= 10^2 \\ &\vdots \\ &\vdots \end{aligned}$$

$$\begin{aligned} 0.1 &= 10^{-1} \\ 0.01 &= 10^{-2} \\ 0.001 &= 10^{-3} \\ &\vdots \end{aligned}$$

Time

0.001 s  $\longrightarrow$  1000's of years

Distance

$10^{-4}$   $\longrightarrow$  10000 miles

Mass

mg  $\longrightarrow$  few tons

See java applet at

<http://micro.magnet.fsu.edu/primer/java/scienceopticsu/powersof10/index.html>

## Length:

Distance	Length (m)
Radius of visible universe	$1 \times 10^{26}$
To Andromeda Galaxy	$2 \times 10^{22}$
To nearest star	$4 \times 10^{16}$
Earth to Sun	$1.5 \times 10^{11}$
Radius of Earth	$6.4 \times 10^6$
Sears Tower	$4.5 \times 10^2$
Football field	$1.0 \times 10^2$
Tall person	$2 \times 10^0$
Thickness of paper	$1 \times 10^{-4}$
Wavelength of blue light	$4 \times 10^{-7}$
Diameter of hydrogen atom	$1 \times 10^{-10}$
Diameter of proton	$1 \times 10^{-15}$

## Time:

Interval	Time (s)
Age of universe	$5 \times 10^{17}$
Age of Grand Canyon	$3 \times 10^{14}$
32 years	$1 \times 10^9$
One year	$3.2 \times 10^7$
One hour	$3.6 \times 10^3$
Light travel from Earth to Moon	$1.3 \times 10^0$
One cycle of guitar A string	$2 \times 10^{-3}$
One cycle of FM radio wave	$6 \times 10^{-8}$
Lifetime of neutral pi meson	$1 \times 10^{-16}$
Lifetime of top quark	$4 \times 10^{-25}$

## Mass:

Object	Mass (kg)
Milky Way Galaxy	$4 \times 10^{41}$
Sun	$2 \times 10^{30}$
Earth	$6 \times 10^{24}$
Boeing 747	$4 \times 10^5$
Car	$1 \times 10^3$
Student	$7 \times 10^1$
Dust particle	$1 \times 10^{-9}$
Top quark	$3 \times 10^{-25}$
Proton	$2 \times 10^{-27}$
Electron	$9 \times 10^{-31}$
Neutrino	$1 \times 10^{-38}$

