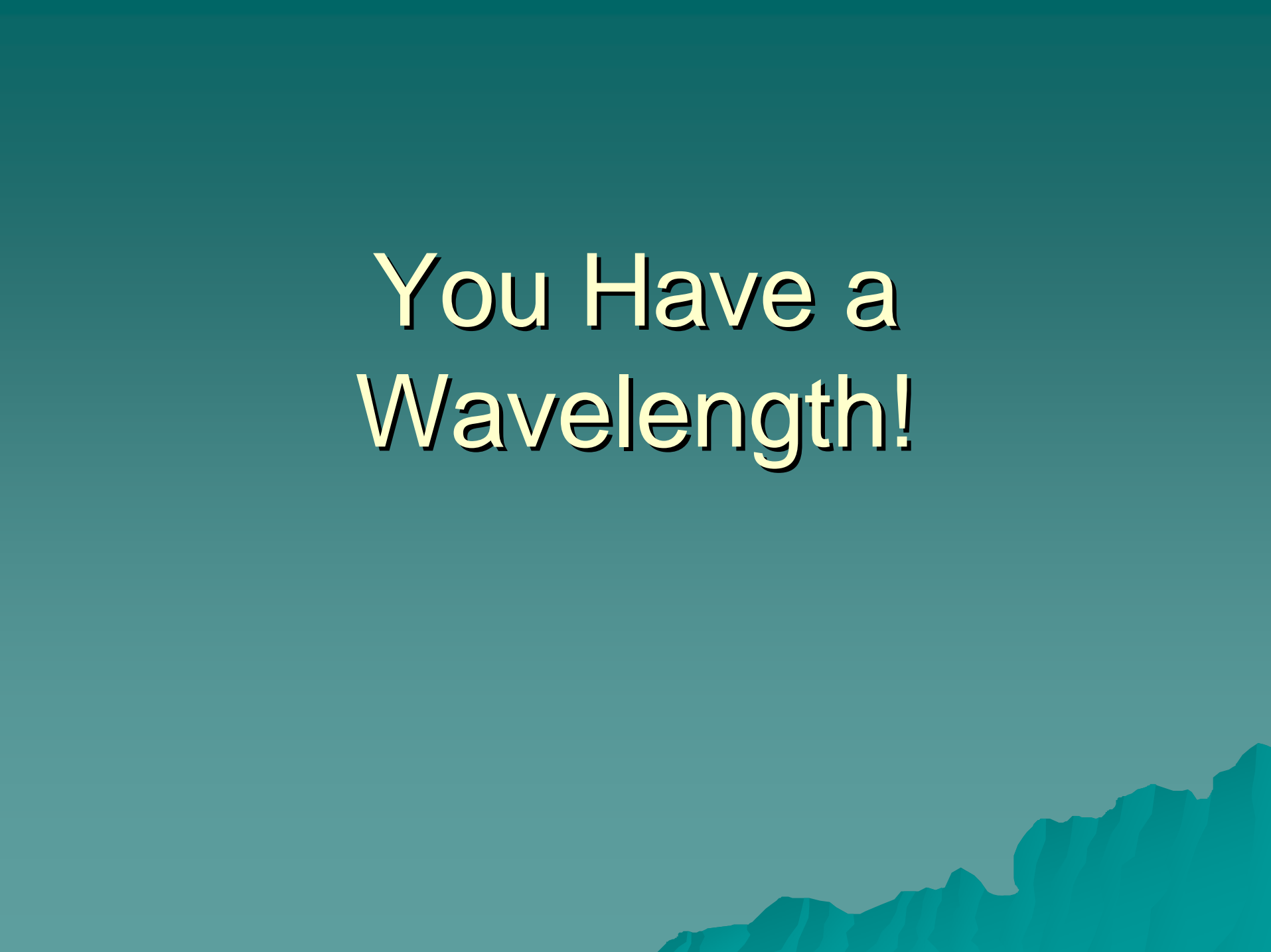


You Have a
Wavelength!

The image features a solid teal background. In the bottom right corner, there is a dark teal silhouette of a mountain range with jagged peaks. The text "You Have a Wavelength!" is centered in the upper half of the image, rendered in a white, bold, sans-serif font with a thin black outline.

When **any** piece of matter is moving, it has a wavelength.

The effects of this wavelength can only be seen when you are dealing with a very small piece of matter, such as a proton or an electron.

The wavelength of moving matter is

$$\lambda = \frac{h}{p}$$

◆ h is called Planck's constant.

$$h = 6.626 \times 10^{-34} \text{ Joule – seconds}$$

◆ p is momentum.

◆ λ is called the de Broglie wavelength.

Calculate the de Broglie wavelength of your classmate:

- ◆ Your classmate has a mass of _____.

1 kilogram = 2.2 pounds

So your classmate's mass in kilograms is

$$\text{_____ } lbs \times \frac{1kg}{2.2lbs} = \text{_____}$$

Your classmate's average speed is

$$v = \frac{\text{distance}}{\text{time}} = \text{_____}$$

Calculate the de Broglie wavelength of a moving proton:

- ◆ A proton is moving at 25,000 meters per second.

Protons have a mass of
 1.672×10^{-27} kg

Use a calculator to determine the
determine the de Broglie wavelength of
the proton.