

## Debroglie Waves

Prince Louis-Victor De Broglie NP1929

1925 PhD Thesis: (I have a copy if it in English)  
matter has wave and particle properties in the same way that light does.

Per Einstein, for a photon:

$$E=hf : E=pc \Rightarrow hf=pc \Rightarrow h \frac{f}{c} = p$$

$$f \lambda = c \Rightarrow \lambda = \frac{c}{f}$$

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

Debroglie said that this applies even if p is associated with matter. Thus the Debroglie wavelength:

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

The verification of matter waves had to wait just a bit but not too long. It was demonstrated by GP Thompson (son of JJ Thompson) NP1937 with cathode ray diffraction

<http://rspa.royalsocietypublishing.org/content/117/778/600>

and by the Davisson-Germer experiment for electrons.  
CJ Davisson NP1937

[http://www.nobelprize.org/nobel\\_prizes/physics/laureates/1937/](http://www.nobelprize.org/nobel_prizes/physics/laureates/1937/)

Note on Germer: (No NP)

<http://deadscientistoftheweek.blogspot.com/2010/10/lester-halbert-germer.html>