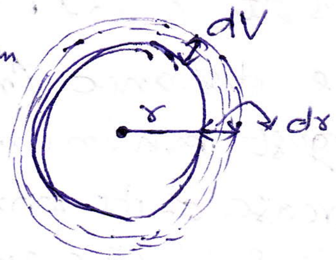
Radial Density / Radial Probability :

Since we are principally interested in the probability of finding electrons at various points in space, we shall be more concerned with the square of the radial function than with the function themselves.

A useful way of looking at the problem is to consider the atom to be composed of layers, much like an onion and examine the probability of finding the electron in the layer which extends from r to $r+dr$ as shown in the figure.



The volume of the thin shell may be considered to be dV. The volume of the sphere

$$V = \frac{4}{3}\pi r^3$$

$$dV = \frac{4}{3}\pi \times 3r^2\, dr$$

$$dV = 4\pi r^2\, dr$$

Multiplying both sides by R^2 we get

$$R^2\, dV = 4\pi r^2 R^2\, dr$$

The probability that an electron will be found is a small volume $\simeq R^2 dV$ or $4\pi r^2 R^2 dr$.

$4\pi^2 r^2 R^2$ is called the radial probability function or radial density function.

Characteristic features of radial probability distribution function :

(1) At $r = 0$, R was not zero, rather it had a high value. But $4\pi^2 r^2 R^2 = 0$. So the probability of finding the electron in the nucleus is zero.