

# PHYS323 – Modern Physics

AMO and Nuclear Physics

# H Wave functions

When  $n=1, l=0, m=0$  : 1s  $\Psi_{1,0,0} = \sqrt{\frac{1}{a_0^3 \pi}} e^{-r/a_0}$

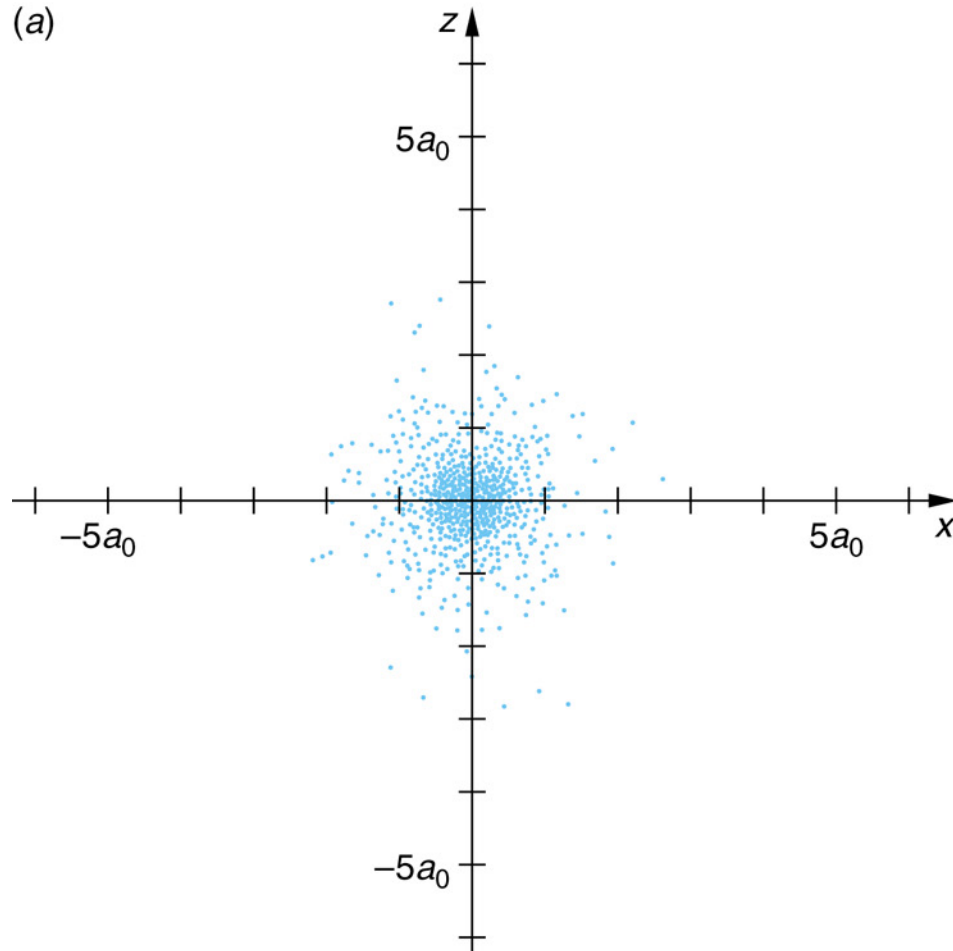
$n=2, l=0, m=0$  : 2s  $\Psi_{2,0,0} = \sqrt{\frac{1}{32a_0^3 \pi}} \left(2 - \frac{r}{a_0}\right) e^{-r/2a_0}$

$l=1, m=0, \pm 1$  : 2p  $\Psi_{2,1,0} = \sqrt{\frac{1}{32a_0^3 \pi}} \frac{r}{a_0} \cos \theta e^{-r/2a_0}$ ,  $\Psi_{2,1,\pm 1} = \mp \sqrt{\frac{1}{64a_0^3 \pi}} \frac{r}{a_0} \sin \theta e^{\pm i\varphi} e^{-r/2a_0}$

# H ground state

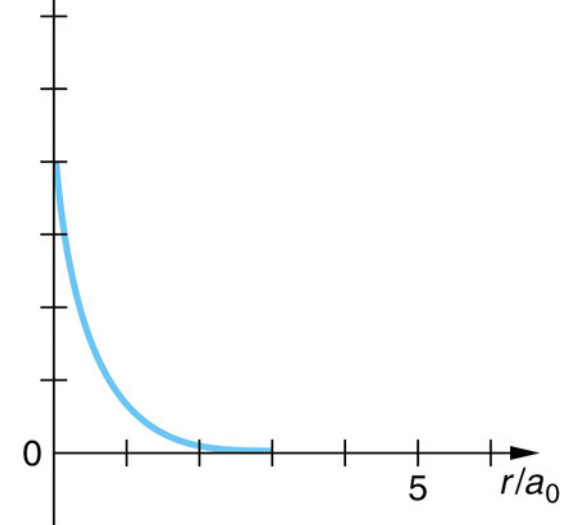
2D projection

(a)

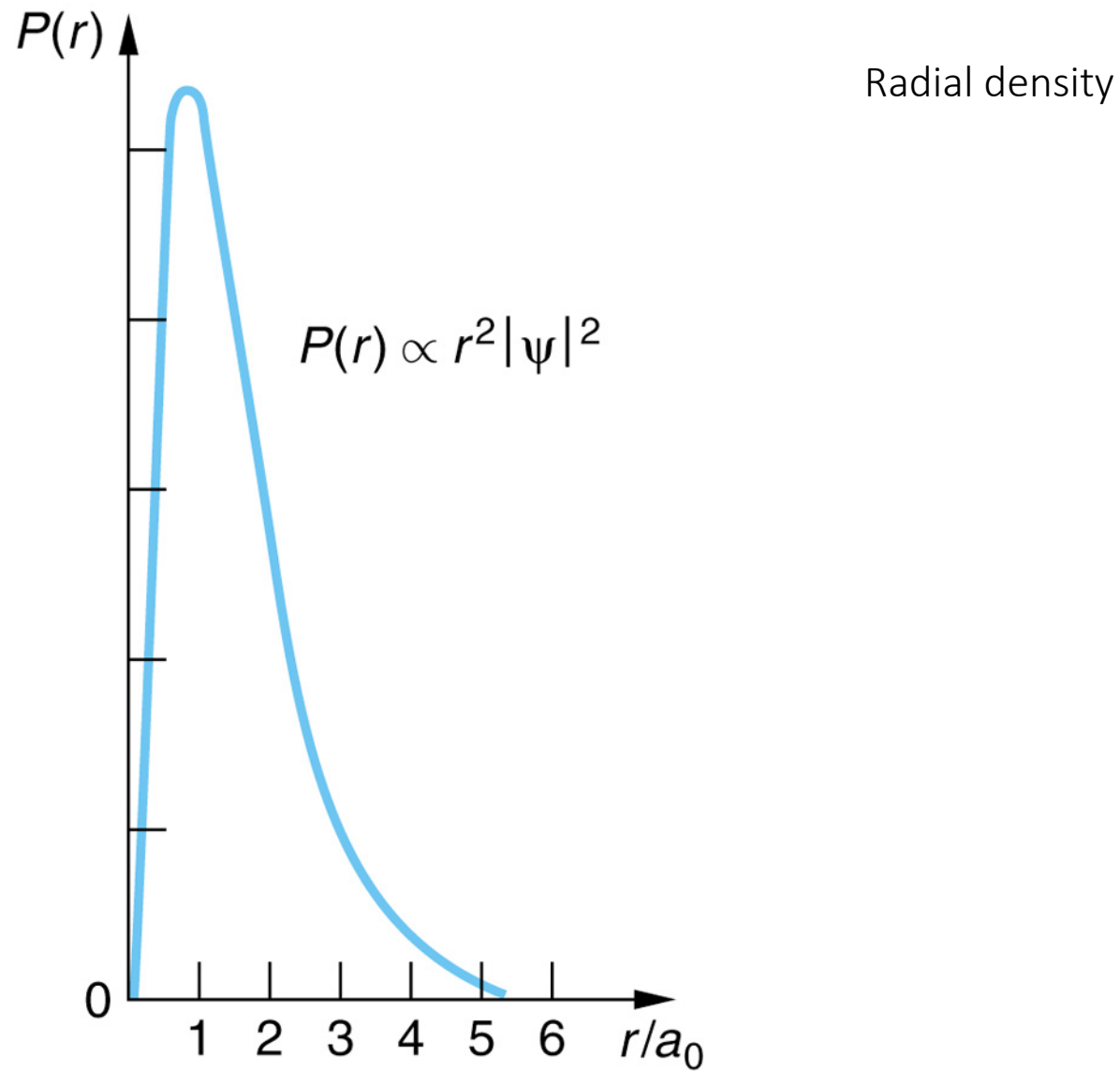


Prob. density

(b)  $|\psi_{100}|^2$

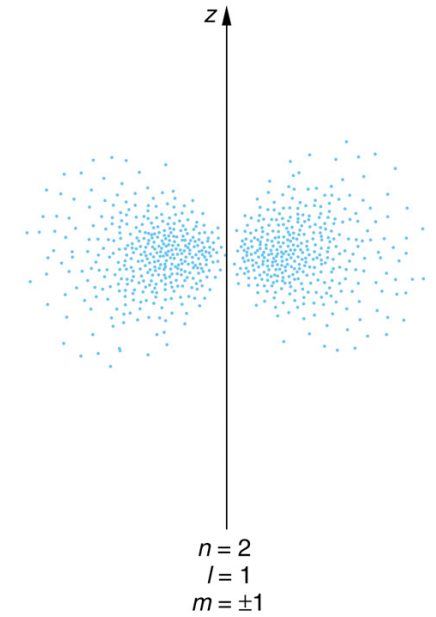
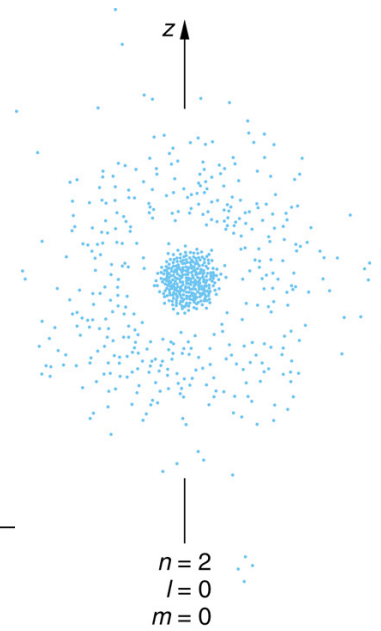
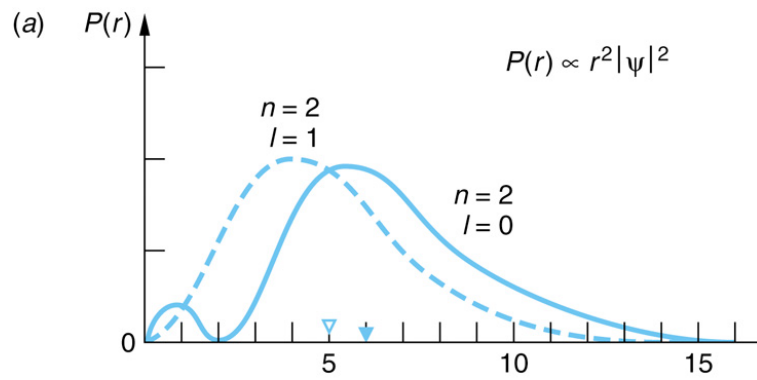


# H ground state



# H excited states

Radial densities



2D projections

