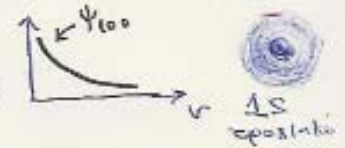


ΘΕΜΕΛΙΩΔΗΣ ΚΑΤΑΣΤΑΣΗ ($n=1$) $\sim l=0 \rightarrow 0, m=0$.

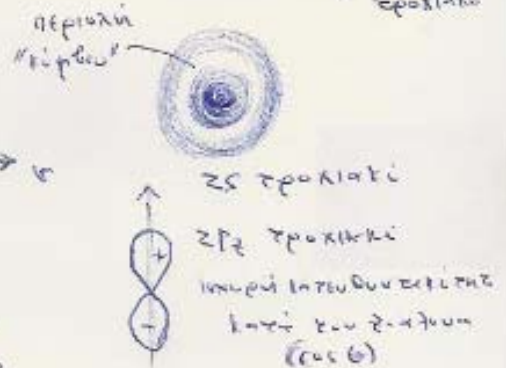
$$\Psi_{100} = R_{10} Y_0^0 = 2r_0^{-3/2} e^{-r/r_0} \cdot \frac{1}{\sqrt{4\pi}} \quad (\text{σφαιρική συμμετρία δίνου})$$

ΠΡΩΤΗ ΔΙΕΓΕΡΜΕΝΗ ($n=2$)

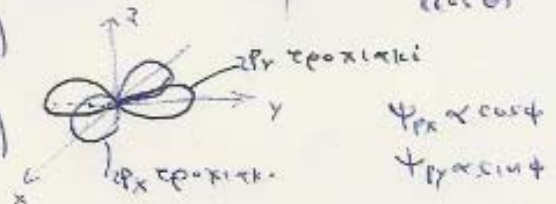
$$\Psi_{200} = R_{20} Y_0^0 = \frac{1}{\sqrt{2}r_0^2} \left(1 - \frac{r}{2r_0}\right) e^{-r/2r_0} \cdot \frac{1}{\sqrt{4\pi}}$$



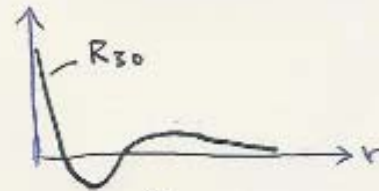
$$\Psi_{210} = R_{21} Y_1^0 = \frac{1}{\sqrt{6}r_0^2} \frac{r}{2r_0} e^{-r/2r_0} \sqrt{\frac{3}{4\pi}} \cos\theta$$



$$\Psi_{21\pm 1} = R_{21} \begin{cases} Y_1^{+1} = -\sqrt{\frac{3}{8\pi}} \sin\theta e^{i\phi} \\ Y_1^{-1} = \sqrt{\frac{3}{8\pi}} \sin\theta e^{-i\phi} \end{cases} \Rightarrow \begin{cases} \Psi_{px} = \frac{1}{\sqrt{2}} (\Psi_{211} + \Psi_{21-1}) \\ \Psi_{py} = \frac{1}{\sqrt{2}} (\Psi_{211} - \Psi_{21-1}) \end{cases}$$

ΔΕΥΤΕΡΗ ΔΙΕΓΕΡΜΕΝΗ ($n=3$)

$$\Psi_{300} = R_{30} Y_0^0 = \frac{2}{3\sqrt{3}r_0^2} \left(1 - \frac{2r}{3r_0} + \frac{2r^2}{3r_0^2}\right) e^{-r/3r_0} \cdot \frac{1}{\sqrt{4\pi}}$$

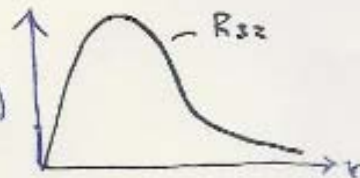


$$\Psi_{310} = R_{31} Y_1^0 = \frac{8}{9\sqrt{6}r_0^2} \left(1 - \frac{r}{6r_0}\right) \left(\frac{r}{3r_0}\right) e^{-r/3r_0} \sqrt{\frac{3}{4\pi}} \cos\theta$$



$$\Psi_{31\pm 1} = R_{31} Y_1^{\pm 1}$$

$$\Psi_{320} = R_{32} Y_2^0 = \frac{4}{9\sqrt{30}r_0^2} \left(\frac{r}{3r_0}\right)^2 e^{-r/3r_0} \sqrt{\frac{5}{4\pi}} (3\cos^2\theta - 1)$$



$$\Psi_{32\pm 1} = R_{32} Y_2^{\pm 1} \begin{cases} Y_2^{+1} = -\sqrt{\frac{15}{8\pi}} \cos\theta \sin\theta e^{i\phi} \\ Y_2^{-1} = \sqrt{\frac{15}{8\pi}} \cos\theta \sin\theta e^{-i\phi} \end{cases}$$

$$\Psi_{32\pm 2} = R_{32} Y_2^{\pm 2} \begin{cases} Y_2^{+2} = \sqrt{\frac{15}{32\pi}} \sin^2\theta e^{2i\phi} \\ Y_2^{-2} = \sqrt{\frac{15}{32\pi}} \sin^2\theta e^{-2i\phi} \end{cases}$$

ΑΣΚΗΣΕΙΣ.

Να γράψουν όλες οι ασκήσεις του βιβλίου σας και του βιβλίου ασκήσεων του Τραχανιά.