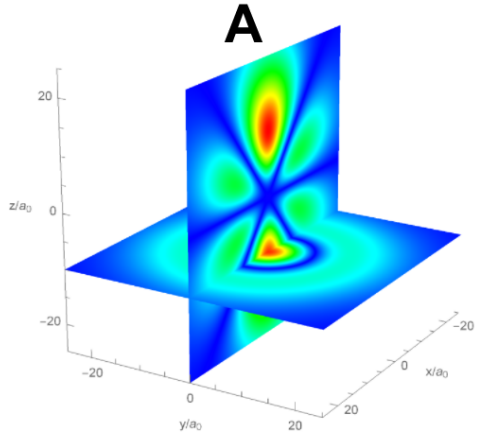
1 Hydrogen Atom Representation Matching

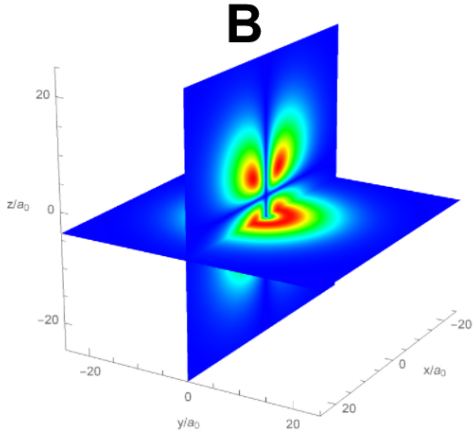
The last page contains 5 different representations for 3 different Hydrogen states. There are wave functions (orbitals) of the hydrogen atom plots, Radial Function Probability Density Plots, Spherical Harmonic Plots, Wavefunctions, and Kets. Your task is match all of the different representations of each state. (You should have 3 groups, each with 5 letters). Please give some short reasoning on how each piece is connected to at least one other piece in the group.

Hydrogen Atom Representation Matching

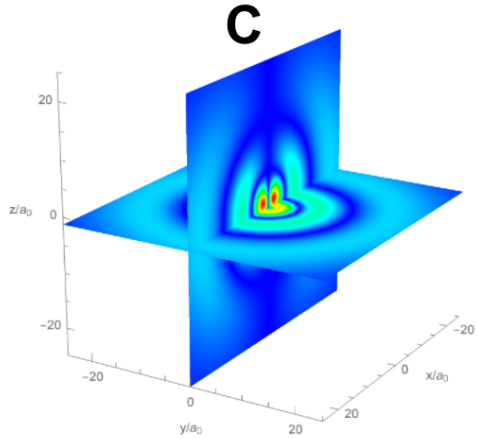
A



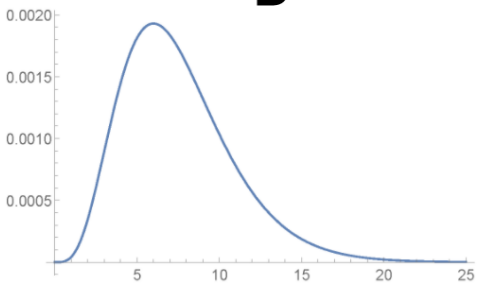
B



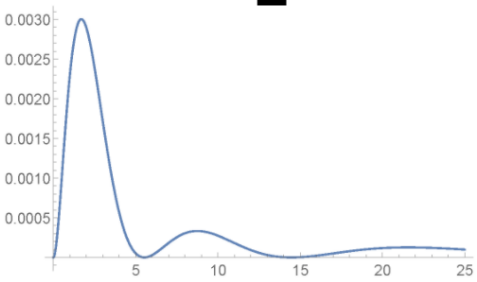
C



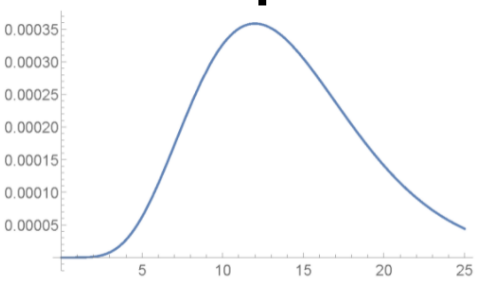
D



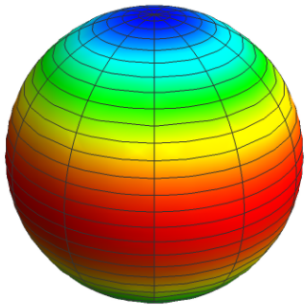
E



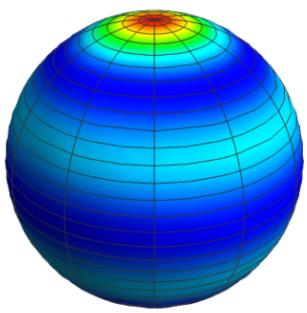
F



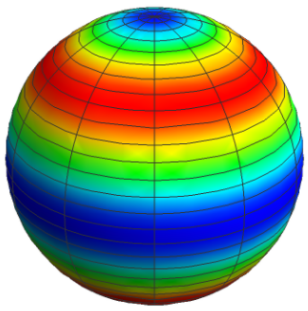
G



H



I



J $\left(\frac{2\sqrt{2}}{81\sqrt{15a_o^7}}\ r^2 e^{\frac{-r}{3a_o}}\right)\left(\sqrt{\frac{15}{8\pi}}\sin\theta\cos\theta e^{-i\phi}\right)$

K $\left(\frac{1}{768\sqrt{35a_o^9}}\ r^3 e^{\frac{-r}{4a_o}}\right)\left(\sqrt{\frac{7}{16\pi}}\left(5\cos^3\theta-3\cos\theta\right)\right)$

L $\left(\frac{\sqrt{5}}{16\sqrt{3a_o^5}}\left(r-\frac{r^2}{4a_o}+\frac{r^3}{80a_o^2}\right)e^{\frac{-r}{4a_o}}\right)\left(-\sqrt{\frac{3}{8\pi}}\sin\theta e^{i\phi}\right)$

M $|4\ 1\ 1\rangle$

N $|3\ 2\ -1\rangle$

O $|4\ 3\ 0\rangle$