

Use the polar plots of the angular wavefunctions below to answer the following question. In each plot, the distance from the center gives the value of the function  $Y$  for the indicated angle  $\theta$ . For a hydrogen-like atom where the electron is occupying a  $p_z$  orbital, how often will the electron be found in the  $x$ - $y$  plane ( $\theta = 90^\circ$ )?

- a. always
- b. never
- c. occasionally
- d. frequently

The  $z$  axis in this figure is the horizontal.  $X$  axis points to the back of the image and the  $y$  axis points up in the plane of the page.

