with time because of our different angular motions. Thus, there is a blueshifted Doppler line from objects in quadrant II, as indicated in Figure 8.7. Similarly, objects in quadrant III are slipping away from us with time, because their angular velocity is slower, so they show a redshift. Quadrants IV and I show blueshifts and redshifts, respectively, outside the solar circle.

Inside the solar circle, the pattern reverses: Objects move at a higher angular velocity than the Sun, so in the first quadrant they are moving away from us, and we measure a redshift. In the fourth quadrant they are moving toward us, so we measure a blueshift.

Beyond the solar circle, the velocities continuously increase or decrease with distance. For example, in the second quadrant the velocity becomes more and more negative (larger blueshifts) for more-distant objects, as shown in Figure 8.8. The radial velocity increases with distance in the third quadrant.

In the first and fourth quadrants, the velocities are a bit more complicated because some points are closer to the Galactic Center than the Sun and some are farther away. In Figure 8.9, the first quadrant shows positive radial velocities inside the solar circle and negative radial velocities beyond the solar circle. The horizontal line indicates that there are two points inside the solar circle that have the same radial velocity.

This duality results because a given line of sight intersects a circle twice, and the component of velocity along the line of sight is identical at each intersection because the two points are moving around the Galactic Center with the same angular velocity and direction cosines. In Figure 8.10, points a and b have different space vectors, but they have the same radial velocity measured from the Sun.