

## 11.9: Distances to the Stars and other Celestial Objects

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When discussing stars, astronomers consider other factors, such as the **star's distance** and **brightness**. These quantities might seem easy to determine at first, yet they are challenging. And to fully understand each star's physical characteristics, we need to determine these most basic of quantities.

The distance to a specific star – beyond our Sun – is not an easy thing to determine. There is no way to use a measuring tape; the tool we are used to using in our own personal universes. As with measuring distances from object to object here on Earth, radar works well for many Solar System objects, but not beyond. The radar beam spreads out too much and loses energy. And it would take over eight years for that beam to travel to the closest star beyond the Sun – Proxima Centauri – and back. By the time the radar beam returned, there would be nothing to receive here on Earth because the beam would have lost all of its energy.

So to measure the distance to nearby stars, astronomers observe an object's **stellar parallax**. This is the apparent shift of an object relative to some distant background as the observer's point of view changes. As Earth and observer orbits the Sun, the specific star being observed will appear to move relative to the background stars. **Parallax is the only method for directly measuring stellar distances.** You may try this by holding a finger up at arm's length. Open one eye and close the other. Now blink; reverse the open-closed eyes. Notice the objects in the distance appear to shift back and forth compared to your closer finger.

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