

What do you understand by cosmic distance ladder? Explain how it is used to estimate distance of stars.

The cosmic distance ladder is a method to determine the distances between objects in space. Different methods can not provide us with satisfactory accuracy of distance measurements at all ranges. Therefore, we use a bunch of techniques which overlap. That is why the ladder analogy arises. One method can be used to measure nearby distances, a second can be used to measure nearby to intermediate distances, and so on. Each rung of the ladder provides information that can be used to determine the distances at the next higher rung.

Methods and their ranges:

- 1) Direct distance measurements in Solar system ;
- 2) trigonometric parallax (up to a few hundred parsecs);
- 3) main-sequence fitting (about 60,000 light-years);
- 4) standard candles
 - using the period-luminosity relation of Cepheid variables (up to 29 mega parsecs)
 - RR Lyrae stars (up to 10 mega parsecs)
 - novae (up to 20 mega parsecs)
 - globular clusters (up to about 200 million light-years)
 - Type Ia supernovae (out to at least 3 billion light-years)
- 5) Planetary Nebula and Globular Cluster Luminosity Function (up to 50 mega parsecs);
- 6) Tully-Fisher relation and Faber-Jackson relation;
- 7) observation of the redshift.

More details on Fig. 1

