2. How to "climb up the distance ladder"?

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Example: GAIA "Globales Astrometrisches Interferometer für die Astrophysik"

↳ Space observatory of the European Space Agency (ESA)

↳ Measures position, distance and motion of stars in a specific brightness range

↳ Goal: 3D map of the Milky Way (≈1.7 billion astronomical objects ≈ 1% of the Milky Way)

↳ The spacecraft will monitor each object about 70 times in 5 years

↑ ∅ > 170.000 ly ≙ 52 kpc

↓ < 15.000 ly

Example: Distances in our solar system:

→ Circumference of the earth:

The Greeks could measure it by measuring the angle of sun light in two cities at the same time. By knowing the distance between the cities he could calculate the circumference.

→ Distance to the moon:

The shadow of the earth is casted on the moon during a lunar eclipse. Knowing the earths size you can calculate the distance

→ Distance to the sun:

Using geometry, the size of the earth, the distance to the moon and the moonphases.

Without any telescope!

→ Distance to planets:

Using radio pulses and knowing the speed of light.

⇒ the astronomical unit could be defined: 149.597.870,7 km = 1 AU

→ Knowing AU calculcs parallax measurements!

Measuring object up to 1000 pc

But beyond that ?

- Use spectroscopy to identify far away star types
- Find close enough and comparable stars
- Compare brightness

=> Distance