

## U3A-GROUP ASTRONOMY (28-10-2005)

### Radiation

#### Electromagnetic spectrum

Long wavelengths →  
Low energy →

← Short wavelengths  
← High energy



What we actually see when watching stars in the night-sky is only a very small proportion of all radiation.

Observing other types of radiation than just what is visible for the human eye, provides us with much information and knowledge which would otherwise not be available.

#### **Star gazing through the centuries**

From Adam & Eve until c. 1600 AD

From c. 1600 until 20<sup>th</sup> century

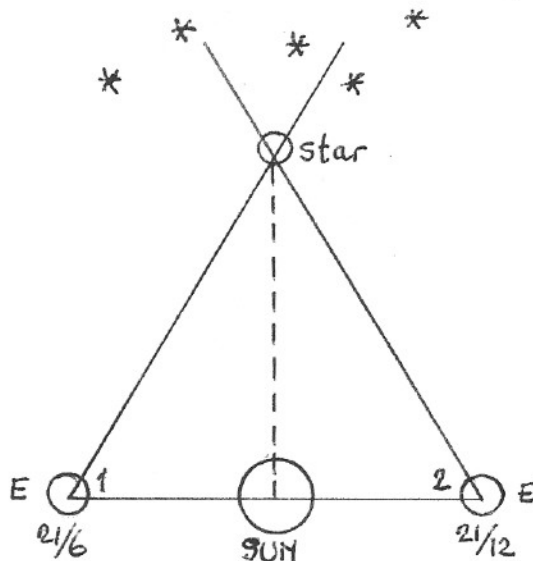
Since c. 1950

Since c. 1960

- Naked eye
- Telescopes for visible light - in ever growing seizes
- Telescopes also for other forms of radiation
- Telescopes on board of satellites

#### **Measuring of Sizes & Distances**

The ancient Greeks were the first to think about sizes, distances etc. and to develop scientific theories about the Universe. They managed to calculate the size of the Earth and the diameter of and distances to the Moon and the Sun. When telescopes came into use after c. 1600, a new method was developed to measure distances to (not too distant) stars:



#### Parallax shift

We know:

- the distance E-S
  - the angle 1
  - the angle between the lines E-S and S-star ( $90^\circ$ )
- so it is easy to calculate the distance between the Earth and the star.  
Only useable for stars not further away than 300 light-years (from Earth) or 500 light-years (from satellites).

For objects nearer to us (Moon, planets) we can nowadays make use of laser beams and radar signals by measuring the time it takes to travel up and down (with the speed of light).

For stars further away distances are measured by comparing their (supposed) absolute brightness with the brightness as observed from the Earth (not very accurate!).