# Emergence Lecture 11 2011

Relativity → Einstein.

young patent clerk 1905.

→ special theory of relativity.

(uses Maxwell + constancy of speed of light → Mechanics).

General theory of Relativity

1915 (prof. in Berlin).

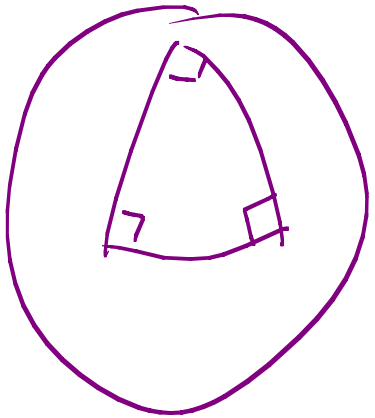
– accounts for accelerations (gravity).

"GR" – modern theory of gravity..
– non-quantum. classical.

explains gravity → space-time is BENT by large masses.

$$\left(\begin{array}{c}\text{shape of}\\ \text{space}\\ \text{time}\end{array}\right) = \text{"G"} \left(\begin{array}{c}\text{Matter}\\ \text{or}\\ \text{energy}\\ \text{density.}\end{array}\right)$$

space time is NOT FLAT.

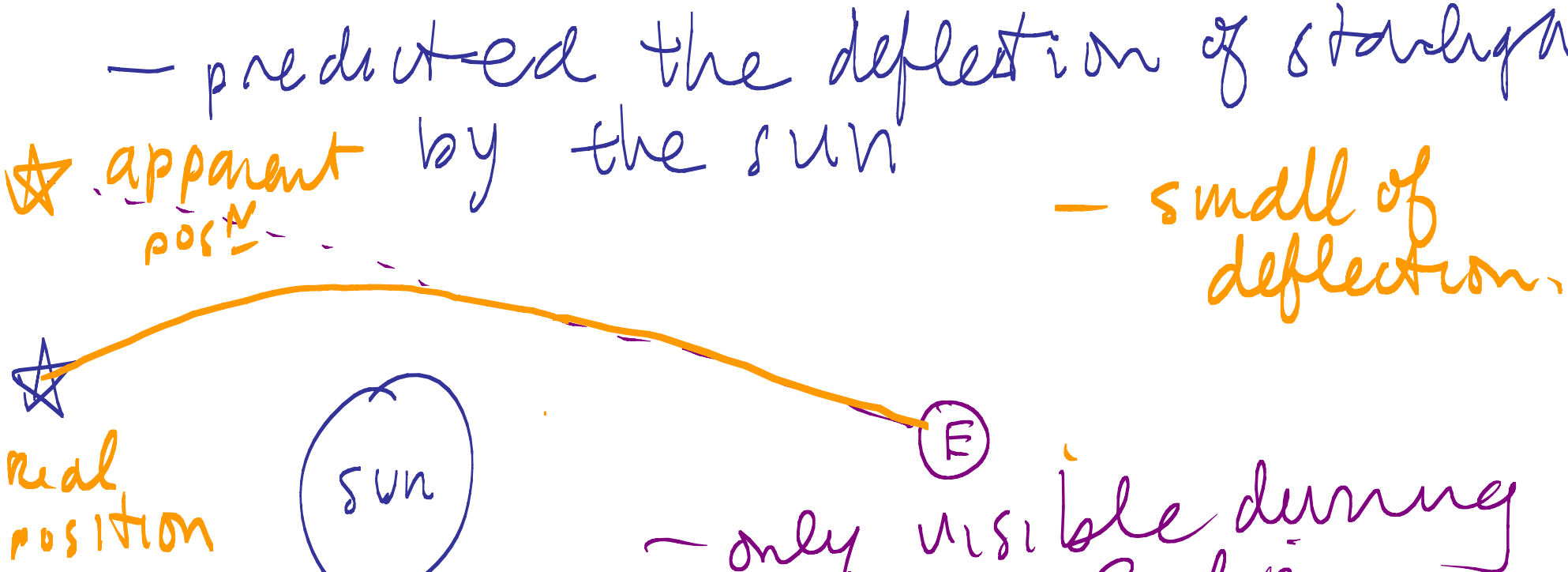


sphere is not flat.
— non euclidean space.

in GR space-time is Dynamic.
— evolves. has lumps, waves etc

— gravitational information goes at "c".
— predicts tiny differences in the orbit of Mercury.

— predicted the deflection of starlight by the sun

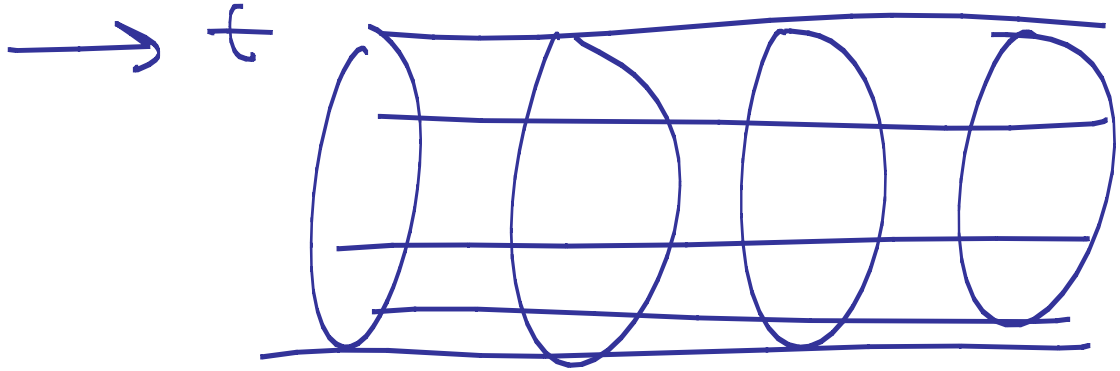



— small of deflection.

— only visible during total Eclipse.

"lensing effect"

- GR applied to COSMOLOGY.
  - solutions always expand!
  - Einstein fixed this with a new term in the Eq$^{n}$s.
    "cosmological constant"
    "greatest blunder of my life".
- Edwin Hubble — universe IS expanding!
  - BIG BANG → extrapolate the expansion back




version with a stabilizing value of $\Lambda$ = cosmological constant