

Redshift Applications

Global Positioning System (GPS)

Accuracy: civil $\sim 5\text{m}$ (military probably 0.1m).

This requires an accuracy in timing $\Delta = 5 \times 10^{-8} \text{ sec}$.

Gravitational Red-shift correction due to Earth's gravity: $\Delta t = 6 \times 10^{-5} \text{ sec}$

SR time dilatation correction: $\Delta t = -2 \times 10^{-5} \text{ sec}$

GPS is impossible without general relativity

- It is an invaluable tool in astronomy: It is relatively easy to measure by indentifying known spectral lines in the light of far away objects. It is of central importance in cosmology.