The Cosmic Distance Ladder

Distance Measurements via Parallax
Hipparcos Satellite Before Launch

GAIA – A Planned Future Mission
Estimating the Distance to a Stop Light

Cepheid Variable Stars

Cepheid variables: outward pressure (P) and inward gravity compression are out of sync, stellar changes size and temperature. If pulsates RR Lyrae variables are smaller and have pulsation periods of less than 24 hours. Also, their light curve looks different from the Cepheid light curve.
The Period-Luminosity Relation for Cepheid Variable Stars

Henrietta Leavitt

HST Observations of Cepheid Variable Stars in M100 at ~ 20 Mpc

HST key project measured Cepheid distances to ~ 25 galaxies within 25 Mpc.
Distances from Type 1a Supernovae

Type Ia supernova
\~ 4 \times 10^9 \text{ Suns}

\~ 1 \text{ SNIa per century per galaxy}

\~ 1 \text{ s}^{-1} \text{ in the Universe}

Mass Discovery of Type 1a Supernovae
Light Curves of Type 1a Supernovae

Peak luminosity and subsequent fading are related.

SNAP – A Planned Mission to Measure Distances to Type 1a Supernovae