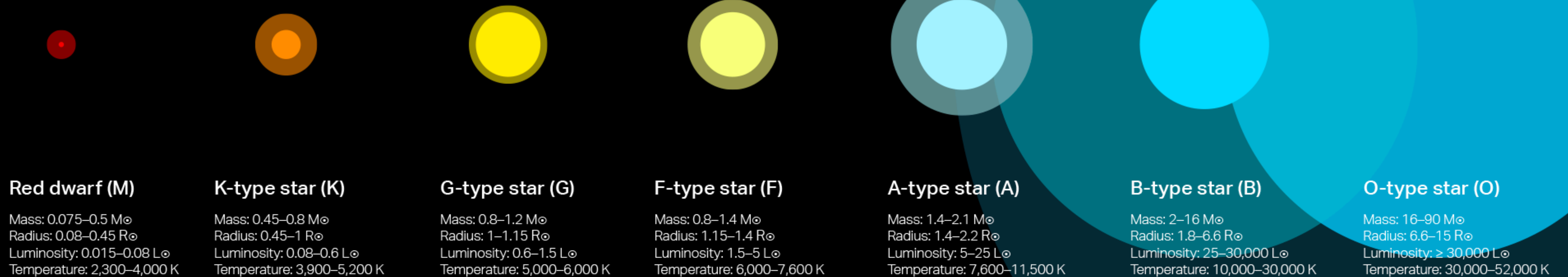


# GATO

Gateway small Automatic Telescope for stellar Occultations by the Moon

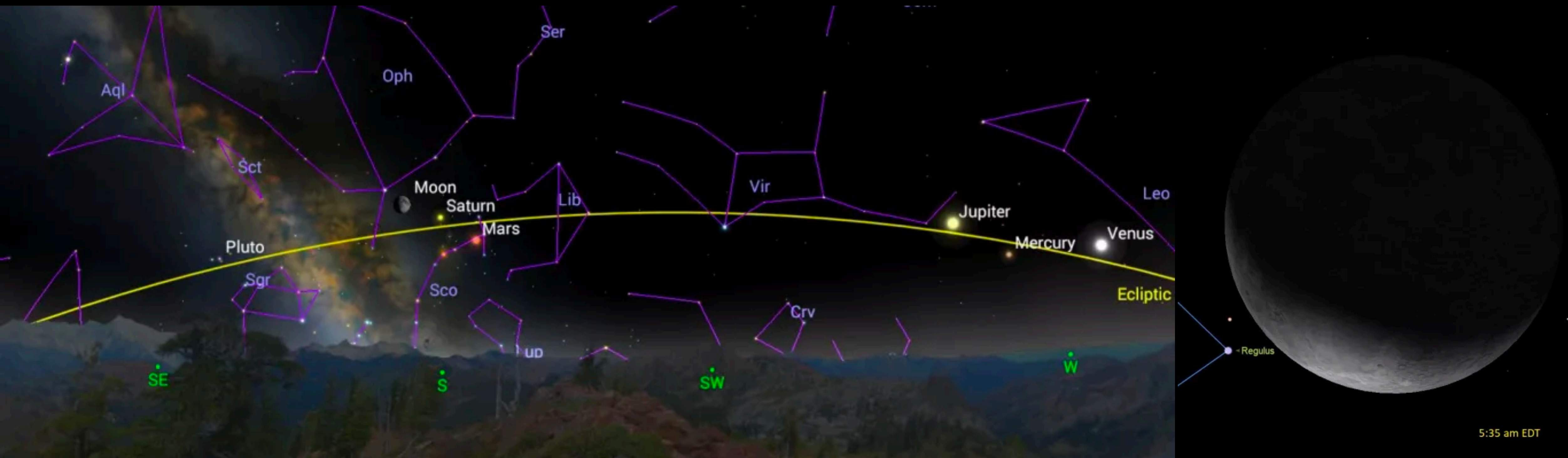
## STELLAR CLASSIFICATION



**Recipe for precisely determining the radius of a single star:** integrate its spectral energy distribution from the ultraviolet to the mid infrared, compute its bolometric luminosity, determine its model-dependent effective temperature from comparison between observed and synthetic high-resolution spectra, and get its radius from  $L = 4\pi R^2 \sigma T_{\text{eff}}^4$ ... **Or measure it directly with an expensive interferometer or via occultation by the Moon!**

# GATO

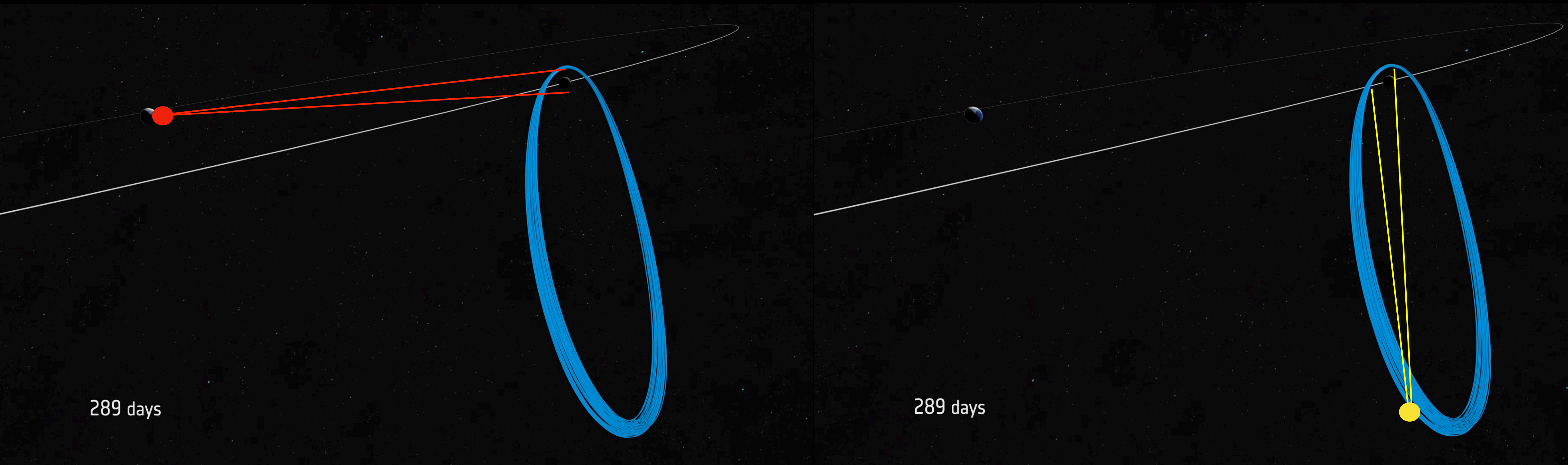
Gateway small Automatic Telescope for stellar Occultations by the Moon



Stars that are occulted by the Moon (from the Earth) have ecliptic latitudes in a narrow  $\pm 6.5$  deg band, such as Regulus, Spica or Antares. Observed for centuries, with no new stars to determine radii, stellar occultations by the Moon are now only observed by amateurs

# GATO

Gateway small Automatic Telescope for stellar Occultations by the Moon



An external bay at the NASA/ESA/CSA/JAXA **Lunar Gateway** would be an advantage point for observers of stellar occultations by the Moon. After a few years, the fraction of sky occulted by the Moon would have dramatically increased, especially towards high ecliptic latitudes

# GATO

Gateway small Automatic Telescope for stellar Occultations by the Moon



GATO would be a simple, small, compact, robust, light-weight, **very small automatic telescope** for stellar occultations, attached to an **external bay** of the Gateway, and equipped with a single **fast read-out optical EMCCD** and/or a near-infrared CMOS with millimagnitude/millisecond capability (thus insensitive to Gateway vibrations) and an artificial-intelligent **scheduler** for maximising the observation time