5. What are the main differeneces between determination of H0 for the different publications?

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([1] W. Freedman [2] A. Riess [3] Planck)

First of all: What is the Hubble Constant H_0 ?

$H(t) = \frac{\dot{a}(t)}{a(t)}$ where $a(t)$ is the scale factor and $H_0 = H(t_0)$ where t_0 = today
↖ see Robertson-Walker metric

Measurements:

[1]: Independent measurement of H_0 based on a calibration of the TRGB applied to a Type Ia Supernovae

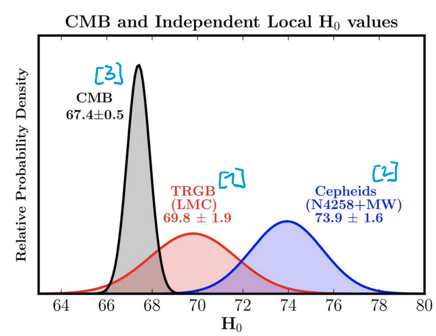
$$H_0 = [69.8 \pm 0.8 \ (\pm 1.1\% \ stat) \pm 1.7 \ (\pm 2.4\% \ sys)] \ \frac{km}{s\,Mpc}$$

This agrees at a level of $1.2\,\sigma$ with [3] and $1.7\,\sigma$ with [2]
Data has been taking using deep Hubble Space Telescope (HST) Advanced Camera for Surveys (ACS)

[2] Also uses the HST, but with Cepheids in the Large Magellanic Cloud (LMC)

$$H_0 = (74.03 \pm 1.42) \ \frac{km}{s\,Mpc}$$

using Detached Eclipsing Binaries (DEBs), masers and Milky Way parallaxes



[3] Uses a model of the universe whose energy and matter density is dominated by dark energy (here, the cosmological constant Λ) and cold dark matter (CDM)
⇒ ΛCDM model which is consitent with various observations including measurement of anisotropies in the temperature and polarization of the cosmic microwave background (CMB), fluctuations in the density of baryonic matter or baryonic acoustic oscillations (BAO), and observations of the magnitude-redshift for high redshift SNe Ia. [1, p. 2]
- This model has 6 parameters only!
- Some parameters are given by CMB measurements, but they do not include H_0

$$H_0 = (67.4 \pm 0.5) \ \frac{km}{s\,Mpc}$$ given indirectly by constraints with very small uncertainty