

# SP3176 The Universe Assignment 3

## DISTANCE To M100

**The more slowly you breathe, the brighter you are.**

Read the paper by Freedman et al., Distance to the Virgo cluster galaxy M100 from Hubble Space Telescope observations of Cepheids, *Nature*, **371**, 757 (1994)

### (i) Determine the distance of M100

Use the following data (these are M100 data for Fig. 2, upper panel)

$\log_{10} P$	$m_V$
1.722	24.92
1.733	25.6
1.663	25.51
1.625	25.5
1.594	25.39
1.505	25.68
1.482	26.22
1.477	26.22
1.416	25.81
1.415	26.32
1.375	25.8
1.365	26.28
1.256	26.18

You will need to use the following equations for your calculations:

$$100^{(m_V - M_V - a_\lambda)/5} = \left( \frac{d}{10\text{pc}} \right)^2$$

$$M_V = -2.76 \log_{10} P - 1.40$$

where  $m_V$  and  $M_V$  are the apparent and absolute magnitude at visible wavelengths of the star respectively,  $a_\lambda = 0.15$  is the mean visual extinction for M100 due to scattering off dust in the intervening interstellar medium (ISM).

### (ii) Science Communication

Suppose you are one of the researchers working on the Hubble Space Telescope (HST) Key Project. Summarize the work of this paper in a paragraph (100 – 200 words), with the layman as your intended audience.

### Administrative details

This assignment is to be done individually, and holds 5% weightage of the total assessment for The Universe. File name for the assignment submission: A3\_A#####X.pdf where A#####X is your matric number.

Submission: Week 8 Saturday