Report No.1 for 銀河天文学特論 III(Ginga tenmongaku tokuron III)

Answer the following questions either in Japanese or in English. Submit your report to the administration office of Department of Astronomy.

Due date: Nov.30 (Thursday), 2017

Q1. Focal length and focal ratio of a telescope

Obtain the focal length to get the pixel scale of 0.2 arcsec / 15um.

What is the focal ratio for the above focal length, if the telescope aperture is 6.5-m?

Q2. Comparisons of the survey speed for the wide-field survey.

The survey speed of wide-field imaging observations is approximately proportional to AΩ, where A is the total light collecting area of the telescope, and Ω is the field of view of the imager. Show that the survey speed is roughly proportional to AΩ, and also discuss what kind of conditions are assumed for this approximation.

Q3. Scientific Goals of the wide-field surveys

Choose two different wide-field surveys (past, on-going, or future), and describe their main scientific goals as quantitative as possible. Use at maximum 1 page (A4) per survey. Do not copy the original web information.

(If you could not attend classes a few times, describe more than two.)

Q4. Spectrographs

Choose two different types of spectrographs, and compare them by describing advantages and disadvantages of those spectrographs.

(If you could not attend classes a few times, compare more than two.)

Q5. Signal to Noise ratio for spectroscopy

Suppose that you carry out spectroscopy of a star of the 25th magnitude (AB) with a 6.5-m telescope. Obtain necessary exposure time to get accuracy of 5% under the following conditions.

 Total efficiency (including atmospheric extinction): 0.2

 Wavelength range: $\lambda = 500$nm, $\Delta \lambda = 1$ nm

 Signal area on the detector: 1 arcsec width

 Readout noise: 2 e- r.m.s. per pixel (5 pixels for 1 arcsec, 3 pixels for 1nm)

 Sky background brightness: 22 magnitude / arcsec^2   (background: 1 arcsec^2)