

Astronomical Observations

2002 Fall --- Final Exam

7 Jan, 2003 18:00~20:00

1. Keck telescopes are a pair of 10-meter diameter telescopes atop Mauna Kea in Hawaii, USA. *Hubble Space Telescope* is a 2.4-meter telescope in orbit of the Earth. Assuming the same optical and mechanical quality and the same instrumentation capability, compare as quantitatively as possible one of the Keck telescopes with *Hubble Space Telescope*, in terms of (1) light collecting power, (2) resolving power, (3) wavelength coverage, and (4) cost. (20%)
2. How large of an angle the Sun (physical diameter of 1.4×10^9 m) would appear if it were at the distance of Proxima Centauri, about 4.3 light years away. Express your result in unit of arcsecond. In order to resolve this angle, what is the required minimal aperture size of an optical telescope? (20%)
3. Describe the differences of appearance among a continual spectrum, an absorption-line spectrum, and an emission-line spectrum. (10%)
4. How does the spectrum of a giant star differ from that of a normal main-sequence star? (10%)
5. How does the adaptive optics help to improve the angular resolution of astronomical observations? Why is the adaptive optics easier implemented in infrared than in optical wavelengths? (10%)
6. Explain briefly the following terms: (1) artificial guide star, (2) pixel, (3) very-long-baseline interferometry (VLBI), (4) flat field, (5) [O III], and (6) 21-cm line of hydrogen. (30%)

Please be sure to pick up your homework sets and projects in the box in front of the instructor's office (S4-906) and also check your grades on www.astro.ncu.edu.tw/obstech, and report any inconsistency to the instructor.