

Astronomical Observations (Fall 2004)
Midterm Exam

16 November 2004, Tuesday 18:00~20:00

1. How does the Earth's atmosphere affect astronomical observations? For each kind of effects, elaborate on an explanation and show some examples of how it influences our observations. (20 points)
2. In stellar photometry, one often uses the color-magnitude diagram, for example V versus (B-V) to characterize the stellar parameters. This diagnostic tool is particularly useful for a star cluster, for which the member stars have the same age, distance, and chemical composition. Explain what kinds of parameters can be derived for a star cluster with its color-magnitude diagram. (15 points)
3. Compare the advantages and disadvantages, optically and mechanically, of a refracting telescope (using lenses) versus a reflecting telescope (using mirrors). Why are modern, large optical telescopes all reflectors? (15 points)
4. Jupiter is at an average of 5 AU away from the Sun. (1) Seen from Alpha Centauri, the nearest stellar system from us, at a distance of 4.3 light years (or 1.3 pc), what is the maximum angle (in seconds of arc) subtended by Jupiter and the Sun? (2) If there is also a Jupiter-like planet around Alpha Centauri, and we want to devise an optical telescope on the surface of the Moon to image the system, what is the minimal required diameter of the primary mirror of this lunar telescope to resolve the star-planet system? (3) The star Alpha Centauri is a 0th magnitude star. Assuming the planet around Alpha Centauri is intrinsically some 10^8 times fainter than the parent star, what is the apparent magnitude of the planet? (20 points)
5. The center of the Milky Way galaxy has the equatorial coordinates of RA~17h and DEC~ - 30 deg. What is the best month/season to observe the Galactic center from Taiwan? Is it better to observe the Galactic center in Australia? If so, why? If not, why not? (15 points)
6. Explain briefly the following terms: (a) meridian, (b) spherical aberration, (c) chromatic aberration, (d) sidereal time, (e) Cygnus. (15 points)