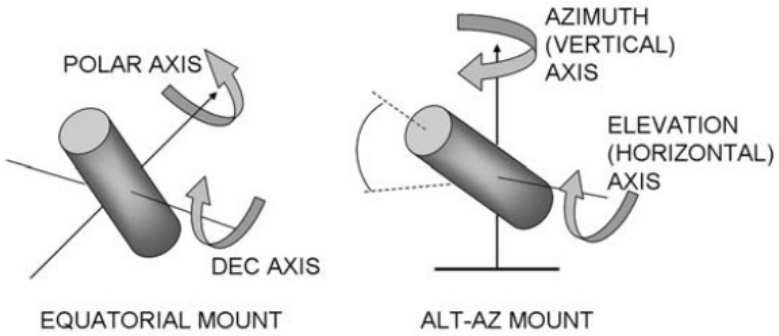
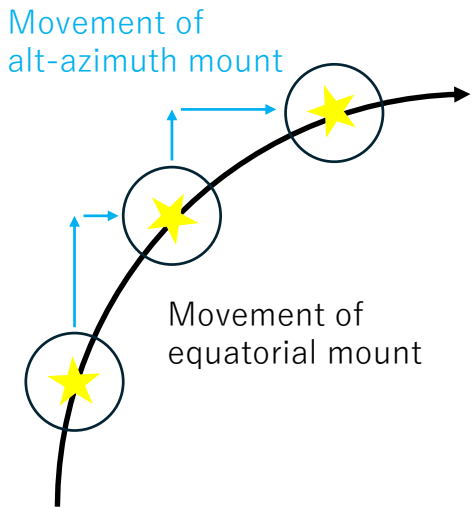
2 Explain the difference between an equatorial mount and an alt-azimuth mount. Give an advantage and disadvantage of each.

	Advantage	Disadvantage
Equatorial mount (赤道儀)	・Can follow object in sky w/ a single-axis (RA/Polar) movement → Easy to track star ・ No field rotation → Better for astrophotography esp. for long exposure	・Need polar alignment for accurate tracking ・Complex structure → Heavy (, less portable)
Alt-azimuth mount (経緯台)	・Simple structure →Light weight, more stable (, portable) →Used for modern (large) telescope	・Field rotation → ・Need counter rotating instrument or rotating an optical compensator e.g. K-mirror ・dead zone near the zenith ・Complex tracking →Need computer control





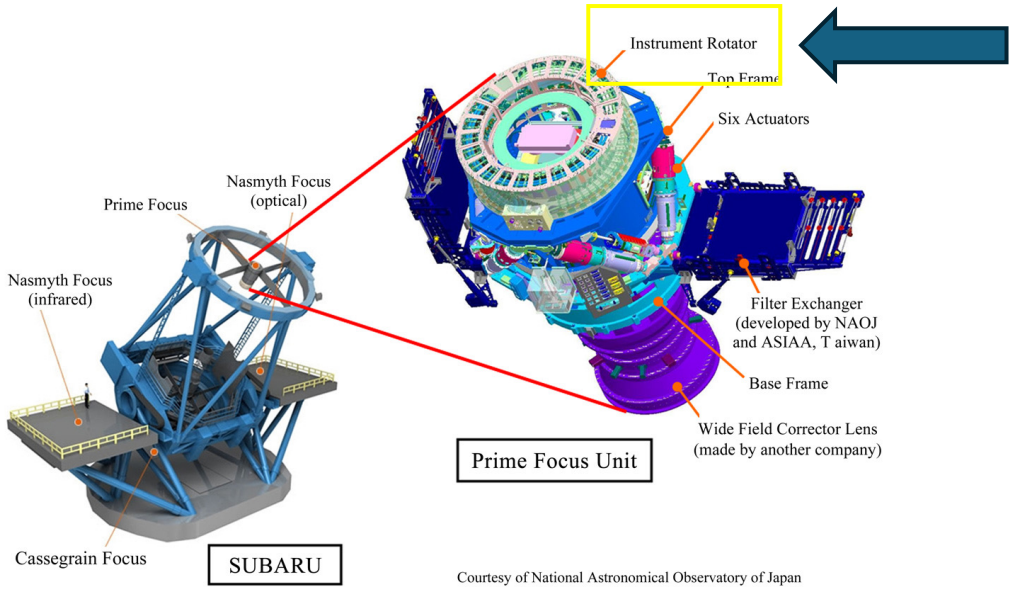
$$\omega = \Omega \cos A \frac{\cos \phi}{\sin z}$$

z close to 0° (zenith)
ω becomes infinitely fast

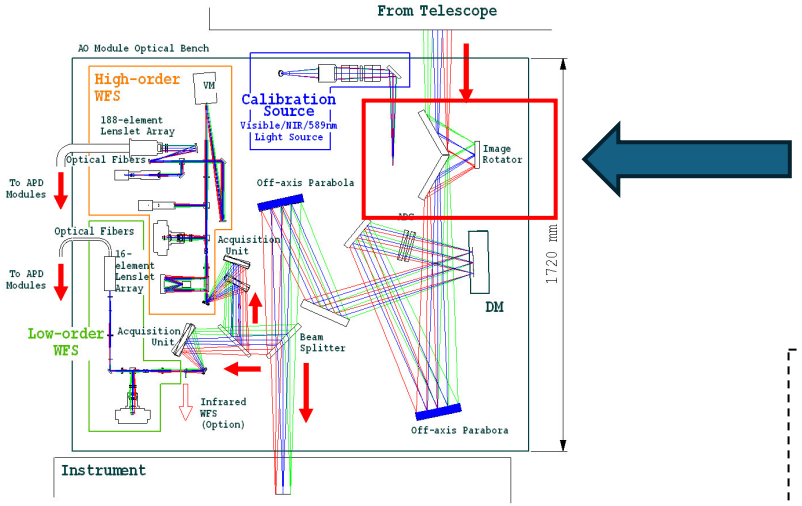
- Equatorial mount

65 cm refractor telescope in Mitaka

- Alt-Az mount



https://www.mitsubishielectric.com/news/2013/0731-b_print.html



https://www.naoj.org/Observing/Instruments/AO/system.html

Transit mounts in Mitaka
- Repsold
- Gautier
- Photoelectric Meridian Circle

8 Calculate the field of view covered by a mosaic of 6×5 CCDs with no overlaps if each CCD has $2{,}048 \times 2{,}048$ pixels mapped to $0.2''$ on the sky. Assuming that each exposure is 20 minutes, how long would it take to cover an area of sky of $10^\circ \times 10^\circ$? How long would it take to cover most of one hemisphere of sky?

- FOV_CCD = 2048 pix × 0.2 as/pix = 409.6 as ~ 0.1138 deg
- Width of mosaic = 6 × 0.1138 deg = 0.6827 deg
- Height of mosaic = 5 × 0.1138 deg = 0.5689 deg
- (10/0.6827) × (10/0.5689) ~ 15 × 18 = 270

→ Time to cover a 10 deg × 10 deg sky area
~ 270 × 20 min = 5400 min = 90 hr

- One hemisphere = 2 pi (180/pi)^2 deg^2 = 20626 deg^2
- Mosaic size projected on sky = 0.6827 × 0.5689 = 0.3883 deg^2
- Time to cover most of one hemisphere
= 20626 / 0.3883 × 20 min = 1062000 min ~ 738 day ~ 2 year