Subaru Telescope

MAKI
SUGI

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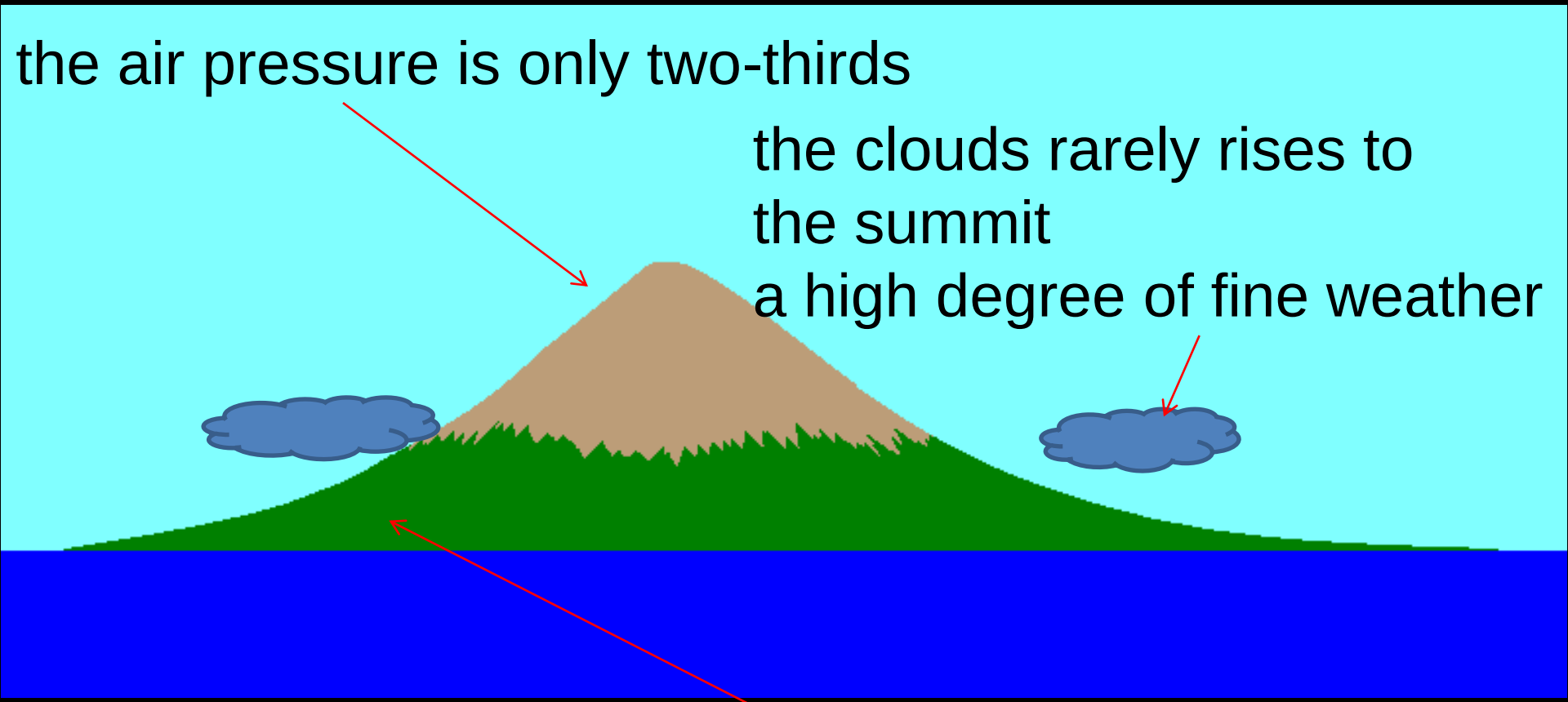
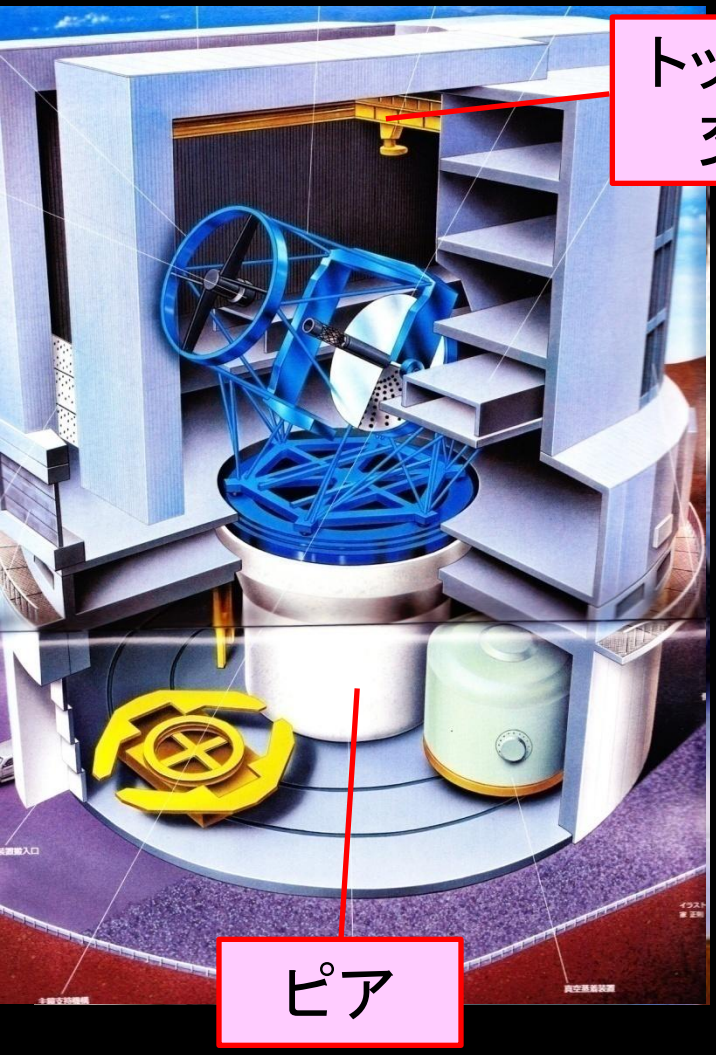
The environment at the summit of Mauna Kea



Telescope basic structure



◎Telescope Structure

g: altitude-azimuth

Height: 22.2 m

Maximum width: 27.2 m

Tracking accuracy : 0.1"

Blind pointing accuracy: 10~89.5°

◎Telescope Enclosure

Height：43 m

Rotating mechanism：linear motor

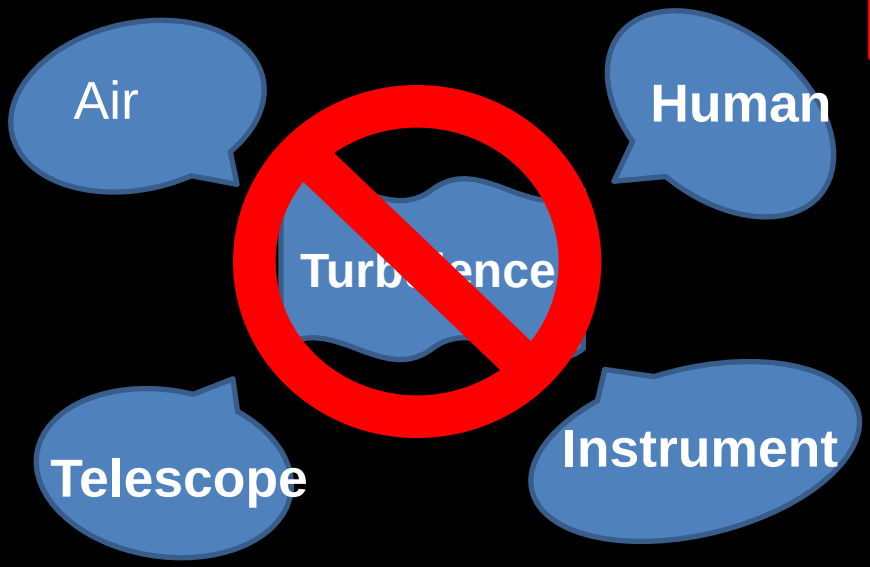
Diameter at base：40 m

Outer wall: aluminum panels

『Newton 1999年3月号』, 編 竹内均, 1999.3.7

The shape of Subaru

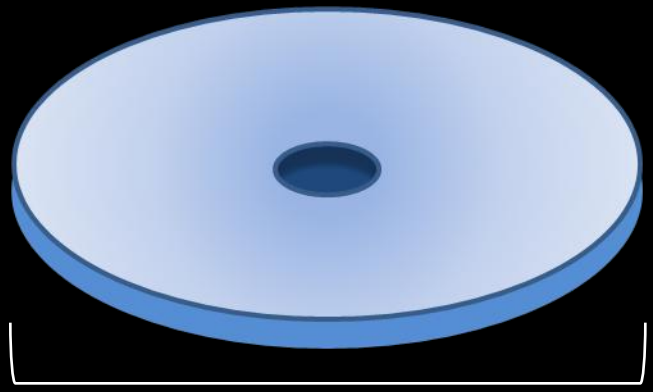
Cylindrical enclosure



Fluid experiments computer simulations adopted a cylindrical enclosure design.

『Newton 1999年3月号』, 編 竹内均, 1999.3.7

Advanced technologies
～ A large 8.2 m diameter primary mirror ～



}Thickness 20 cm

Diameter 8.2 m

Surface

- Vacuum deposition of Aluminum
- Reflects nearly 92% of visible light
- The surface average error is only 14nm

『Newton 1999年3月号』, 編 竹内均, 1999.3.7

- The surface error of the primary mirror

Diameter the $8.2\ \mathrm{m}$ mirror (Area $52.8\ \mathrm{m}^2$) : error $14\ \mathrm{nm}$

The Big Island $10432.5\ \mathrm{km}^2$: only a thickness of an ordinary sheet of paper

The size of primary mirror in the Subaru Telescope is No.2 in the world.

⇒The world's best is the LBT.

$8.4\ \mathrm{m} \times 2 : 11.8\ \mathrm{m}$

Advanced technologies
～Active Optics～

261 robotic fingers in the back of the primary mirror

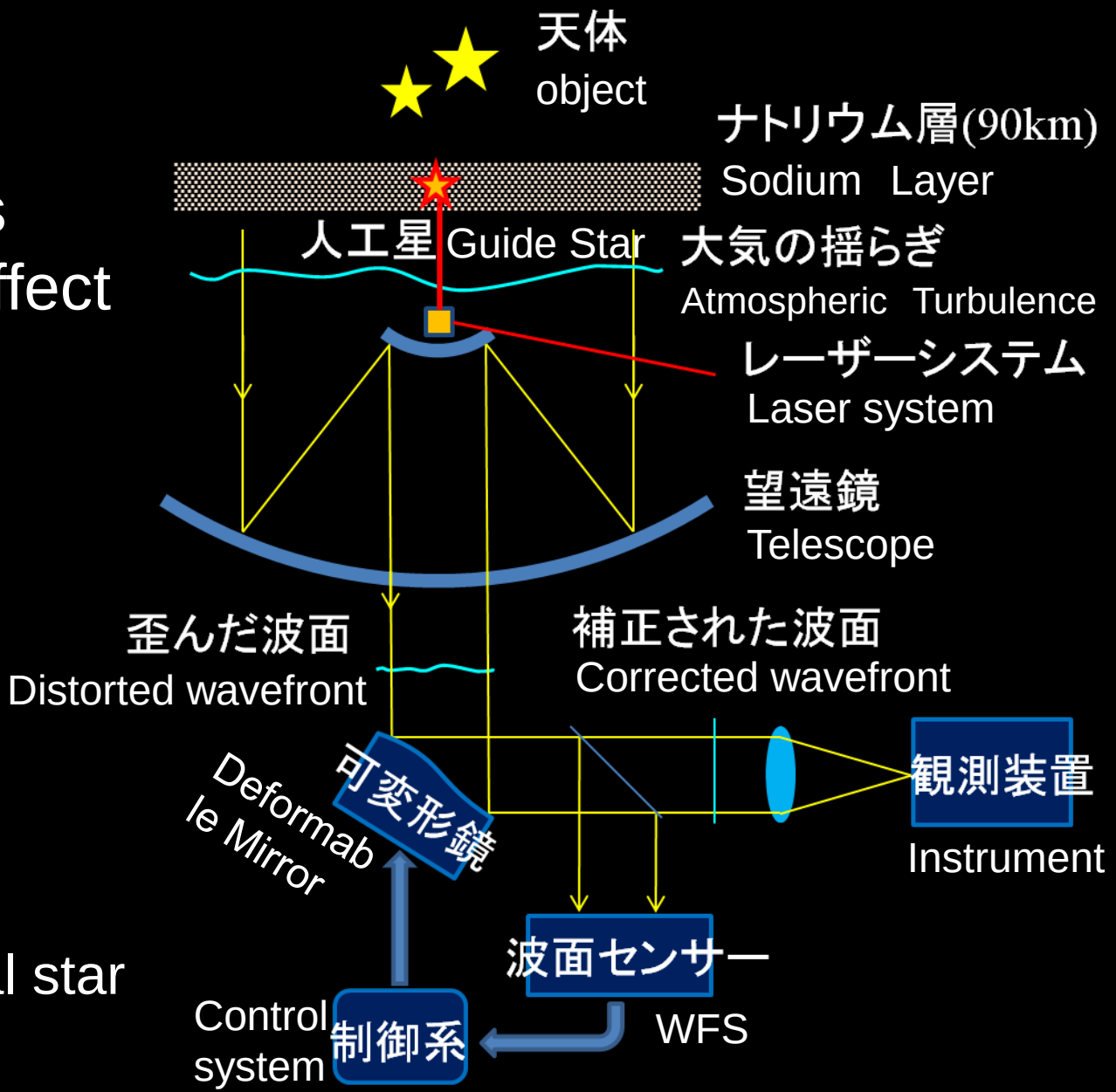
⇒ Compensate for temperature changes and deformation effects such as weight

In the telescope of large aperture the Subaru Telescope adopts active optics in the first

～Adaptive optics ～

・Adaptive optics correct for the effect of turbulence in real-time

Clear star needed in the field
⇒A laser beam to produce an artificial star

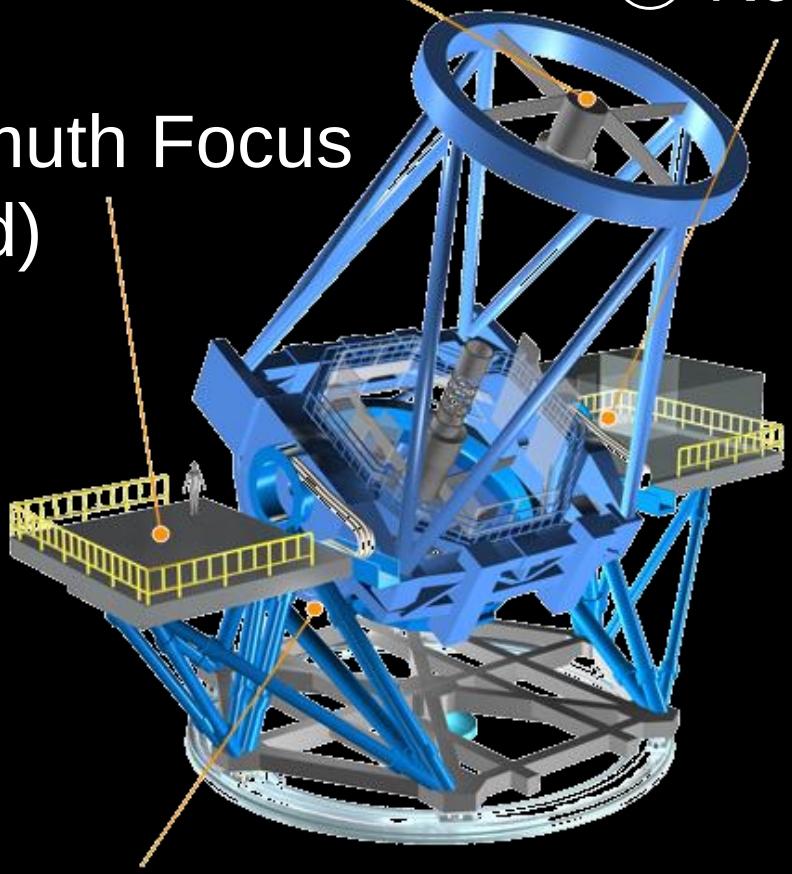


Subaru's Four Focus

① Prime Focus

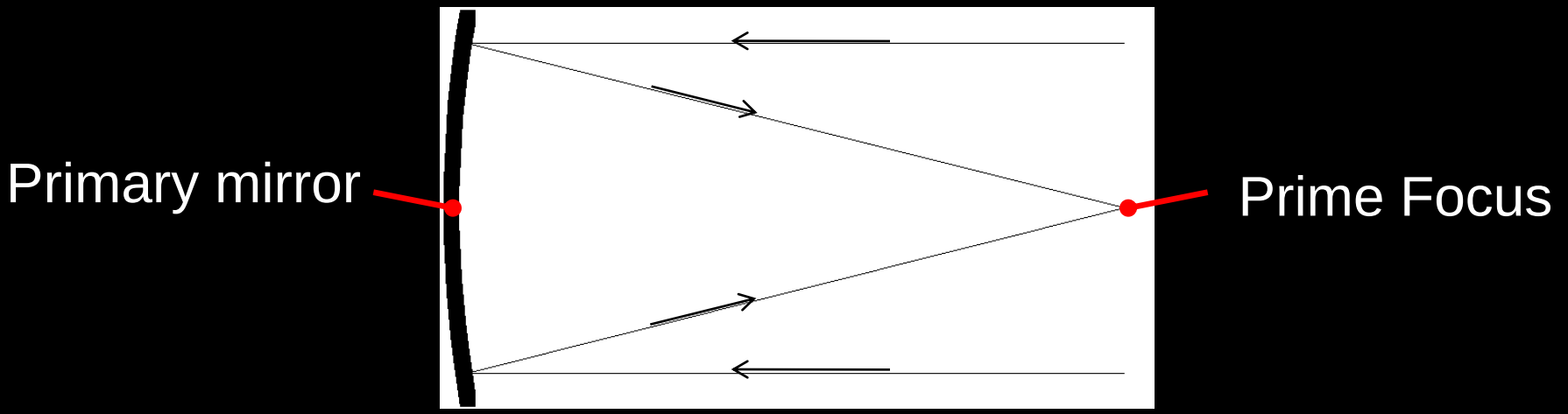
③ Nasmuth Focus
(Optical)

④ Nasmuth Focus
(Infrared)



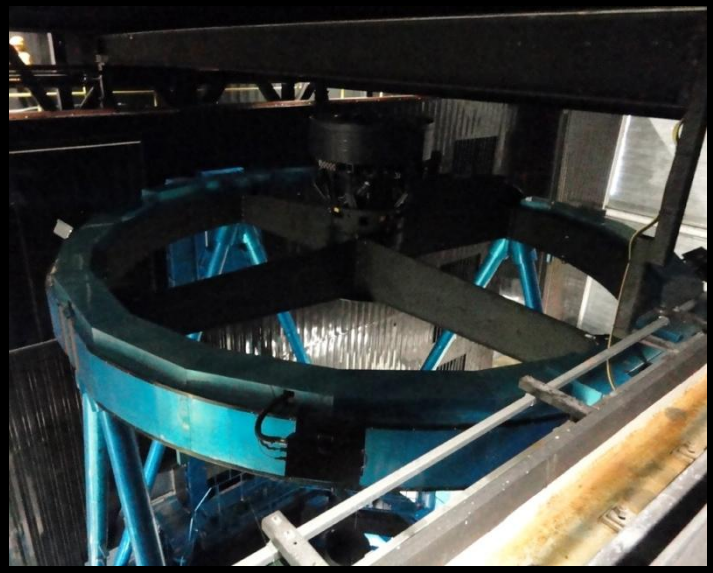
② Cassegrain Focus

① Prime Focus

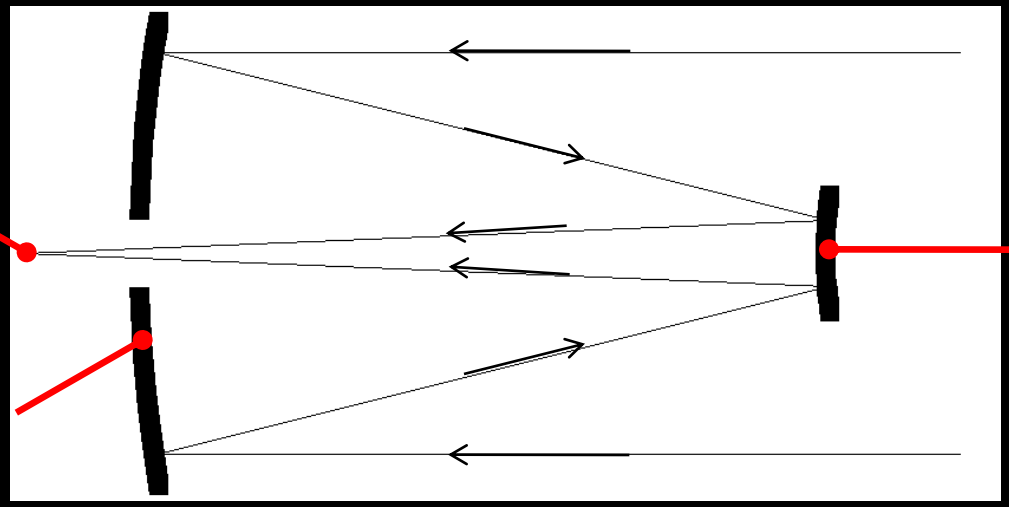


・We can take wide view

but…
Other telescope of large aperture can’t install observing system at prime focus
⇒ Subaru’s Features

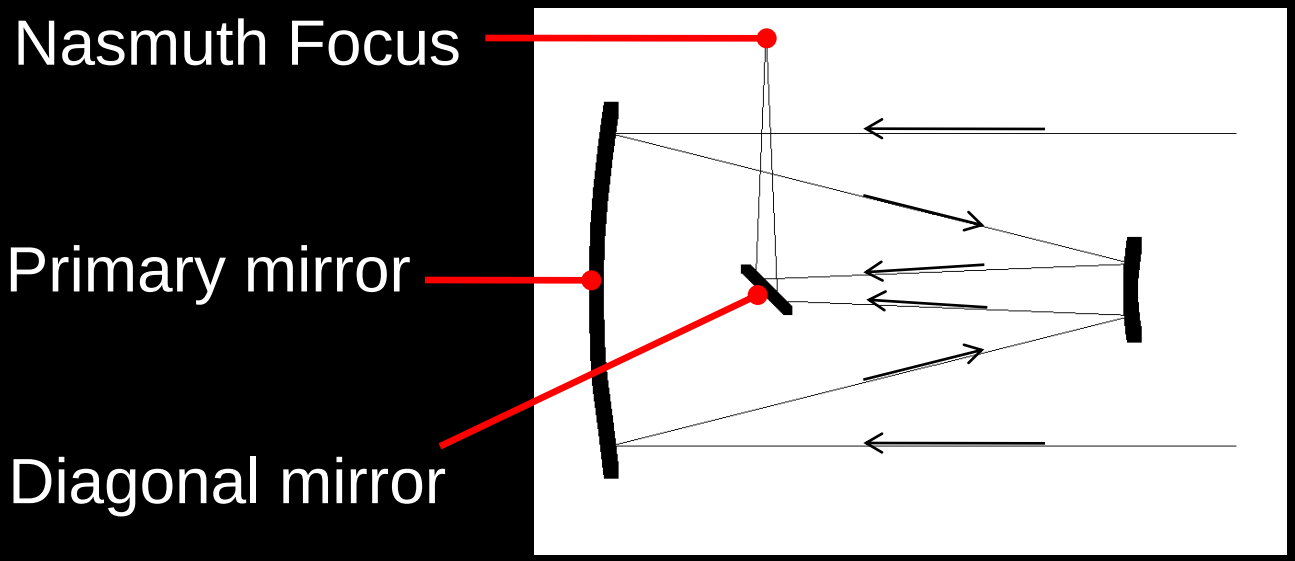


② Cassegrain Focus



Cassegrain focus can be mounted in a relatively complex equipment

③④ Nasmuth Focus



Devices does not change the location of the device
⇒Devices may be mounted in weight and large

・Subaru has two Nasmuth Focus

まとめ

すばる望遠鏡はその性能を最大限活かすためにあらゆる技術が駆使されている

・大気や装置によるゆらぎの影響を最小限に抑える
　円筒形ドーム
・誤差14nmの表面を誇る8.2m単一鏡
・鏡の自重や姿勢変更によるひずみを直す能動光学
・大気のゆらぎをリアルタイムで補正する補償光学
・主焦点を含む4つの焦点