

Subaru Telescope

The background of the entire image is a dense field of stars, likely from the Pleiades star cluster, appearing in various colors including blue, green, and white against a dark night sky. In the lower right foreground, the dark, multi-tiered structure of the Subaru Telescope is visible, with a few small, bright lights at its base.

MAKI
SUGI

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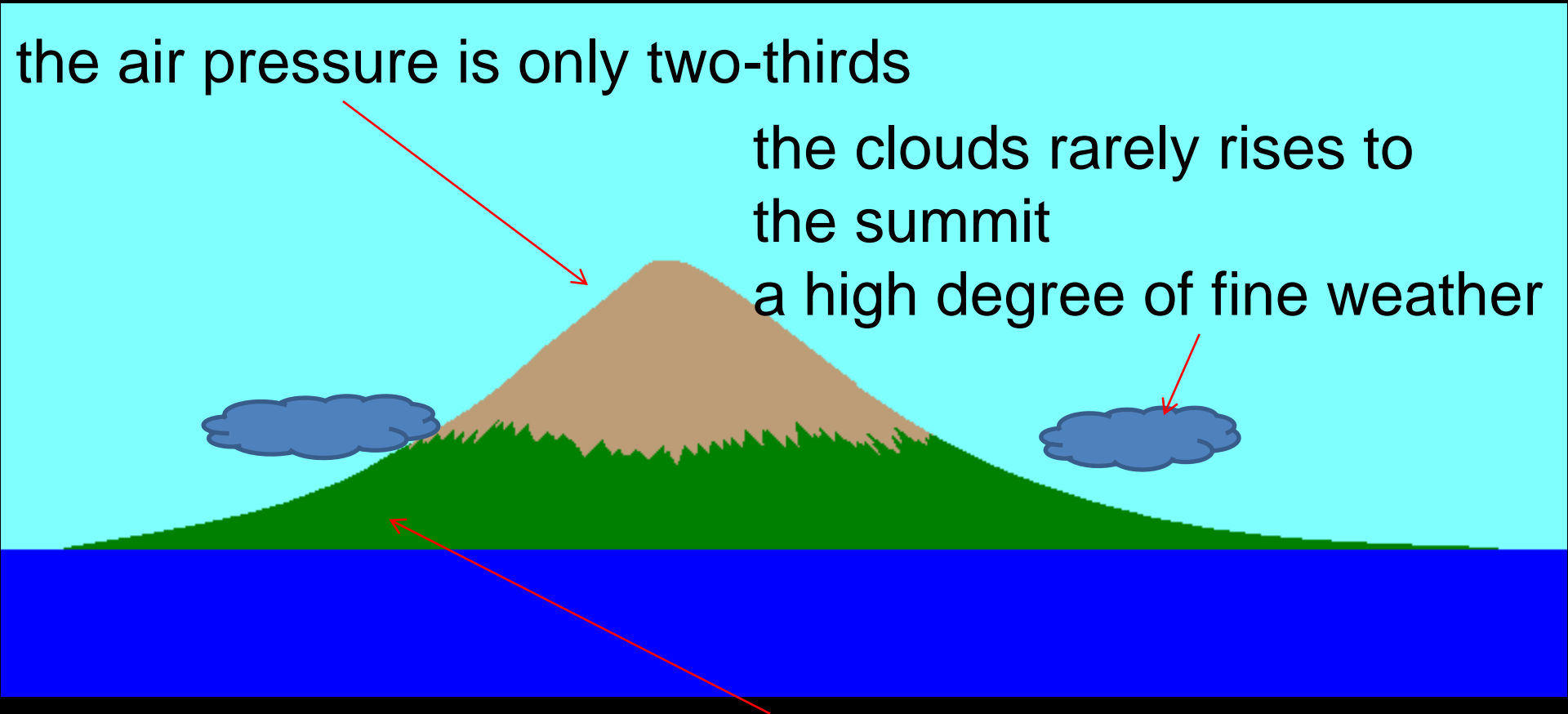
- 1 すばる望遠鏡の立つマウナケア山頂の環境
- 2 すばる望遠鏡の形
- 3 すばる望遠鏡の技術～口径8.2mの単一鏡～
- 4 すばる望遠鏡の技術～ひずみを直す能動光学～
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- 6 すばる望遠鏡の4つの焦点

The environment at the summit of Mauna Kea

the air pressure is only two-thirds

the clouds rarely rises to
the summit

a high degree of fine weather



there are few cities to pollute its dark skies.

Telescope basic structure



トップユニット
交換装置

ピア

◎Telescope Structure

Tracking: 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

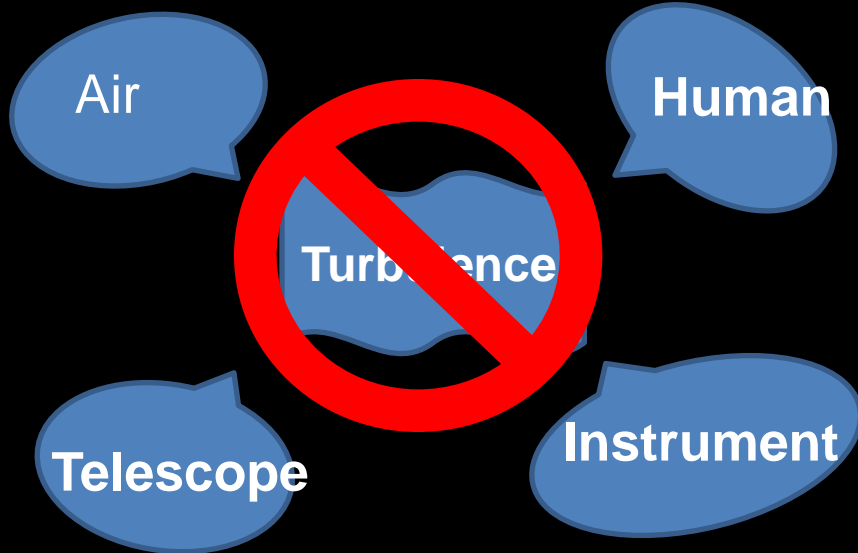
Rotating mechanism: linear motor

Diameter at base: 40 m

Outer wall: aluminum panels

The shape of Subaru

Cylindrical enclosure



可動ウインド
スクリーン

前面ルーバ

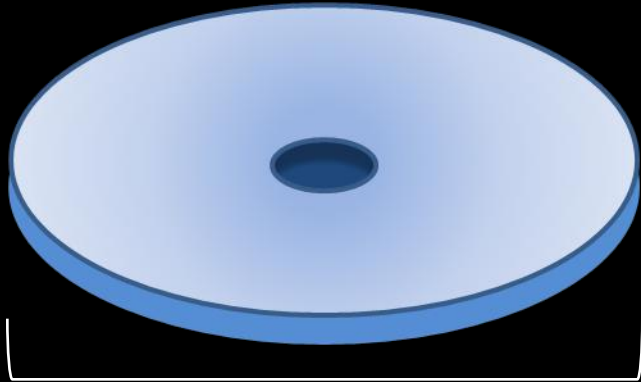
側面ルーバ



Fluid experiments
computer simulations
adopted a cylindrical
enclosure design.

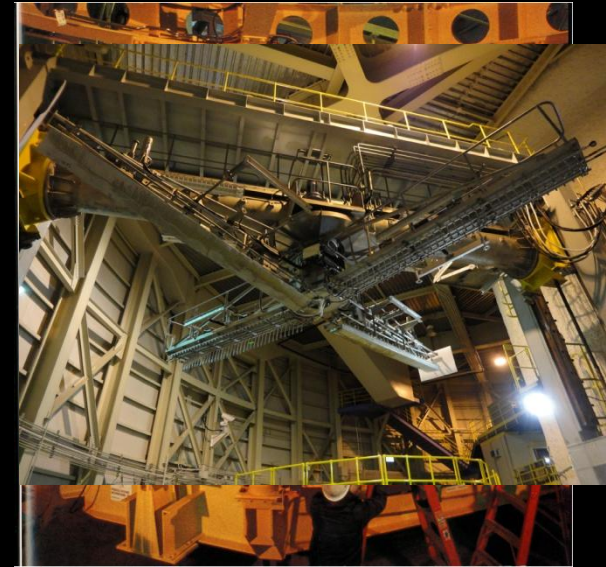
Advanced technologies

~ A large 8.2 m diameter primary mirror ~



Diameter 8.2 m

} Thickness 20 cm



Surface

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

• The surface error of the primary mirror

Diameter the 8.2 m mirror (Area 52.8 m²) : error 14 nm



The Big Island 10432.5 km² : 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 m × 2 : 11.8 m

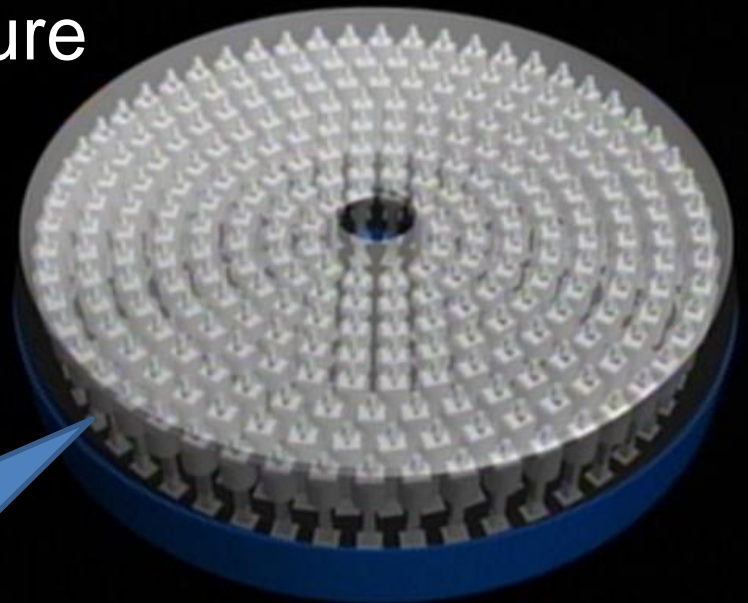
Advanced technologies

~ Active Optics ~

261 robotic fingers in the back of the primary mirror

⇒ Compensate for temperature changes and deformation effects such as weight

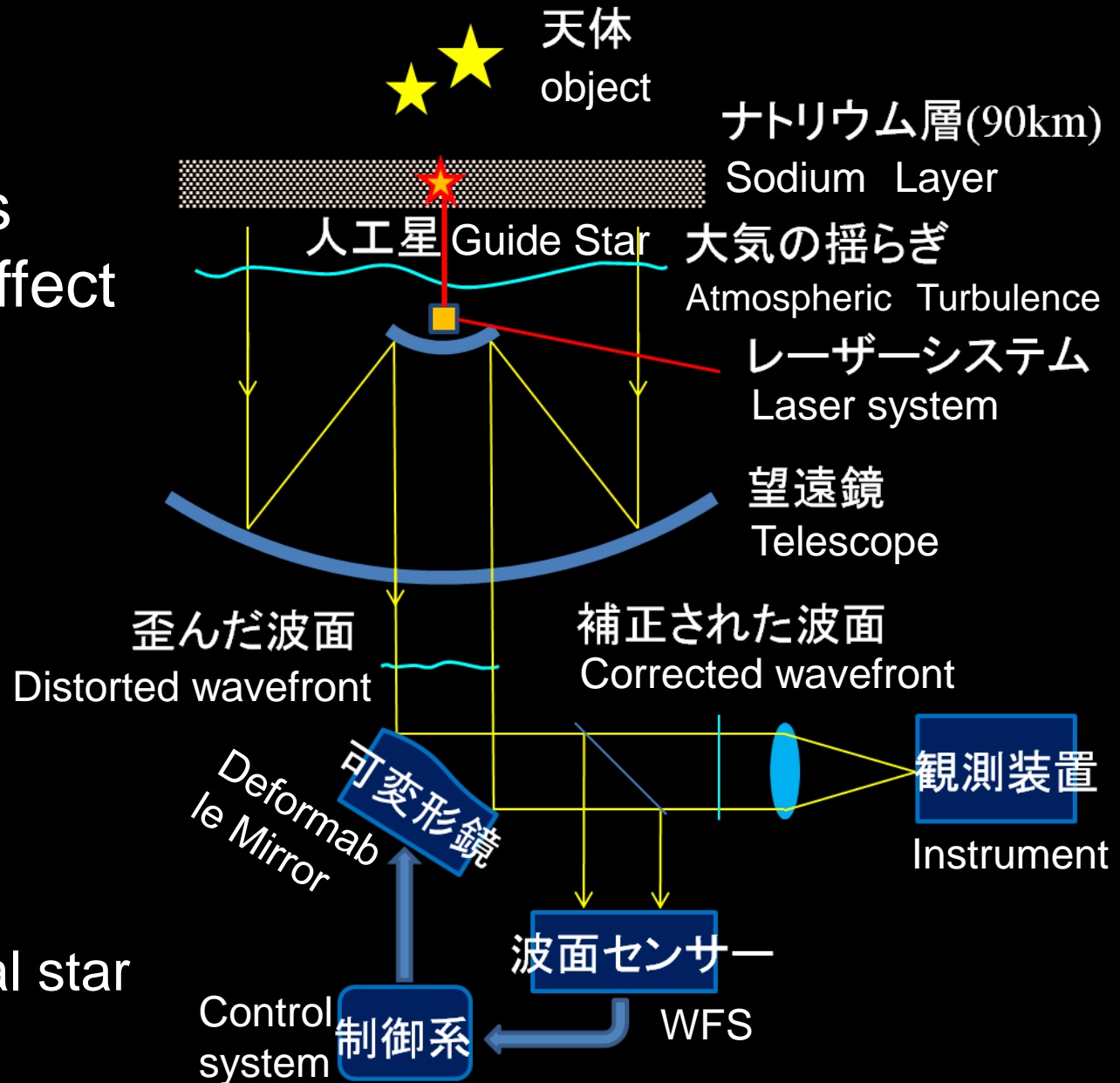
In the telescope of large aperture
the Subaru Telescope adopts
active optics in the first



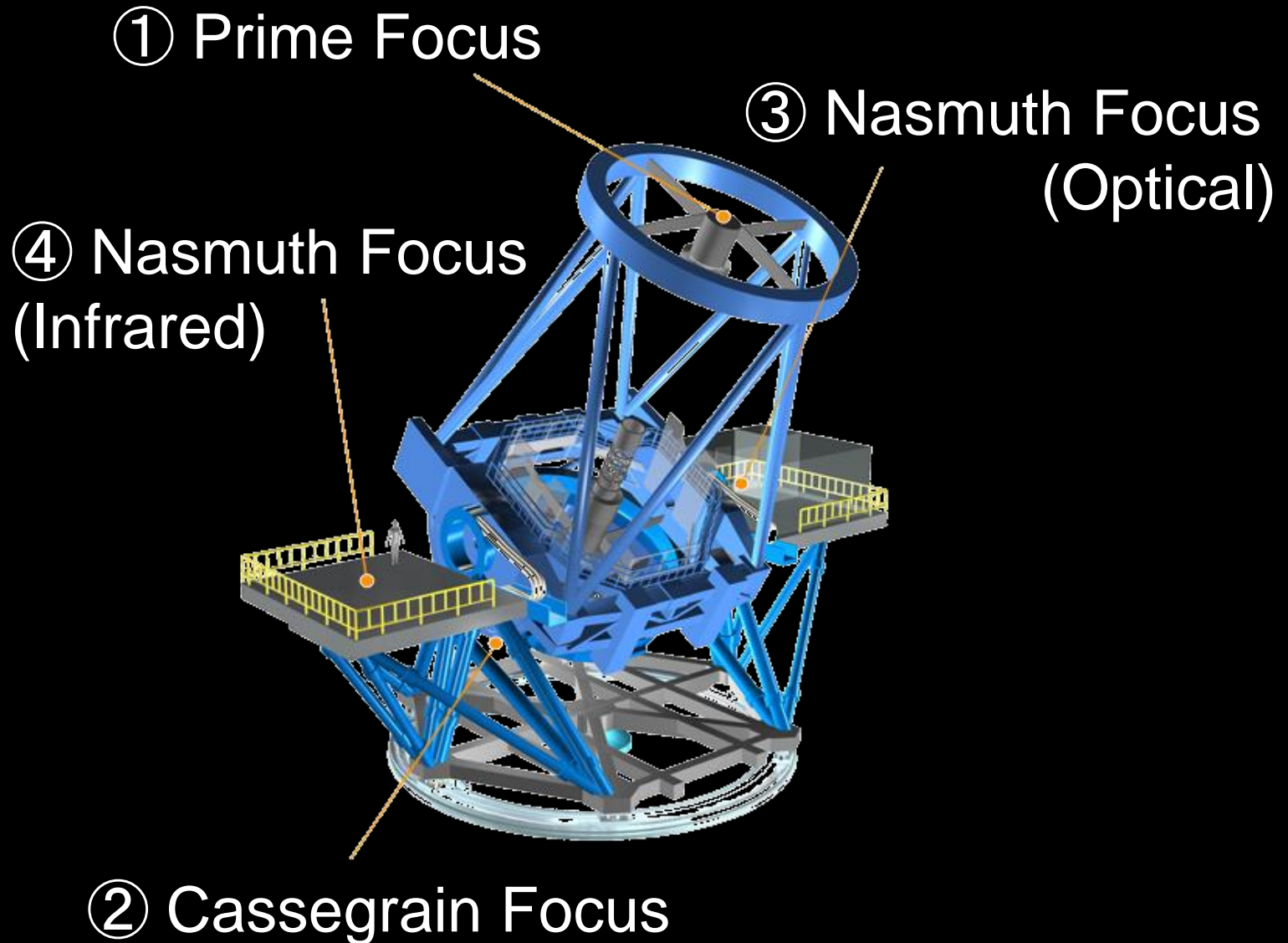
~ Adaptive optics ~

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

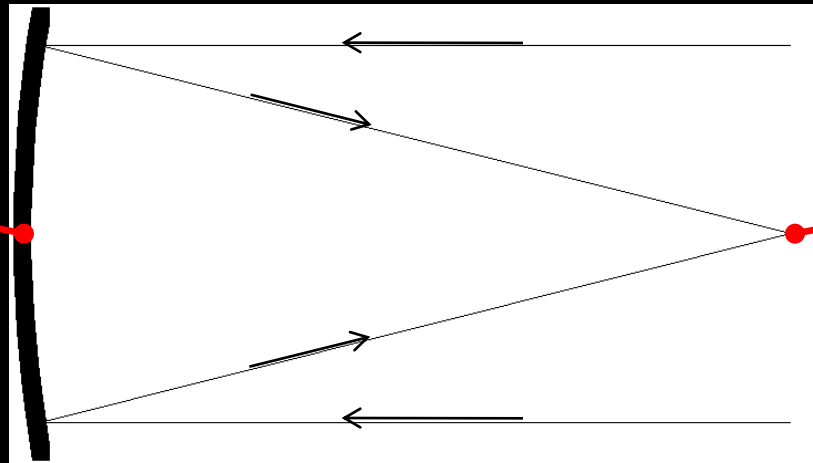


Subaru's Four Focus



① Prime Focus

Primary mirror

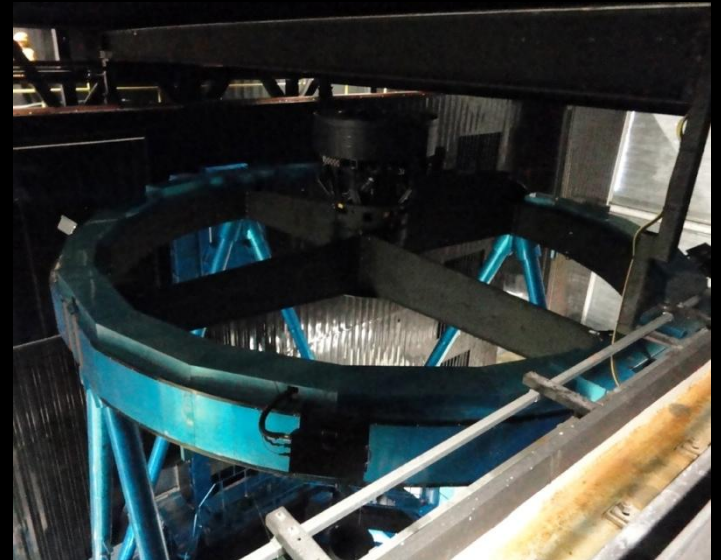


Prime Focus

• We can take wide view
but...

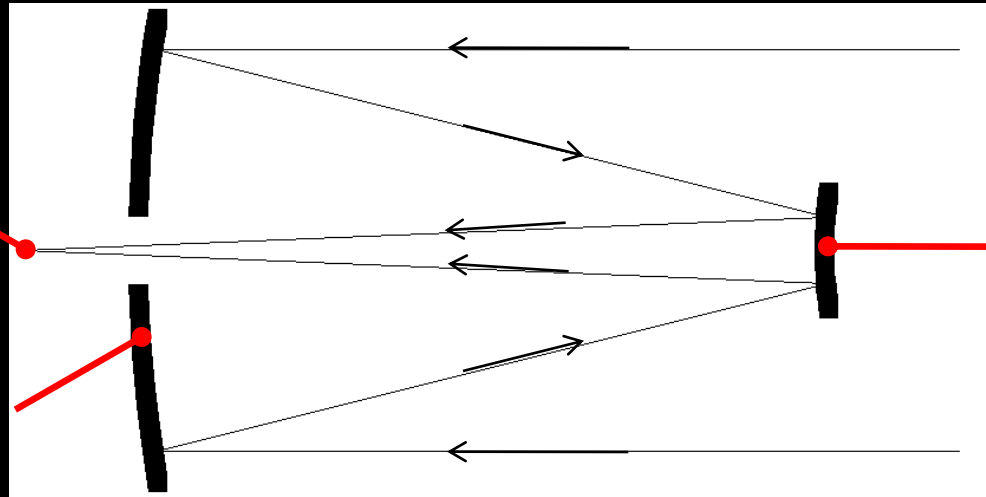
Other telescope of large
aperture can't install observing
system at prime focus

⇒ Subaru's Features



② Cassegrain Focus

Cassegrain Focus
Primary mirror

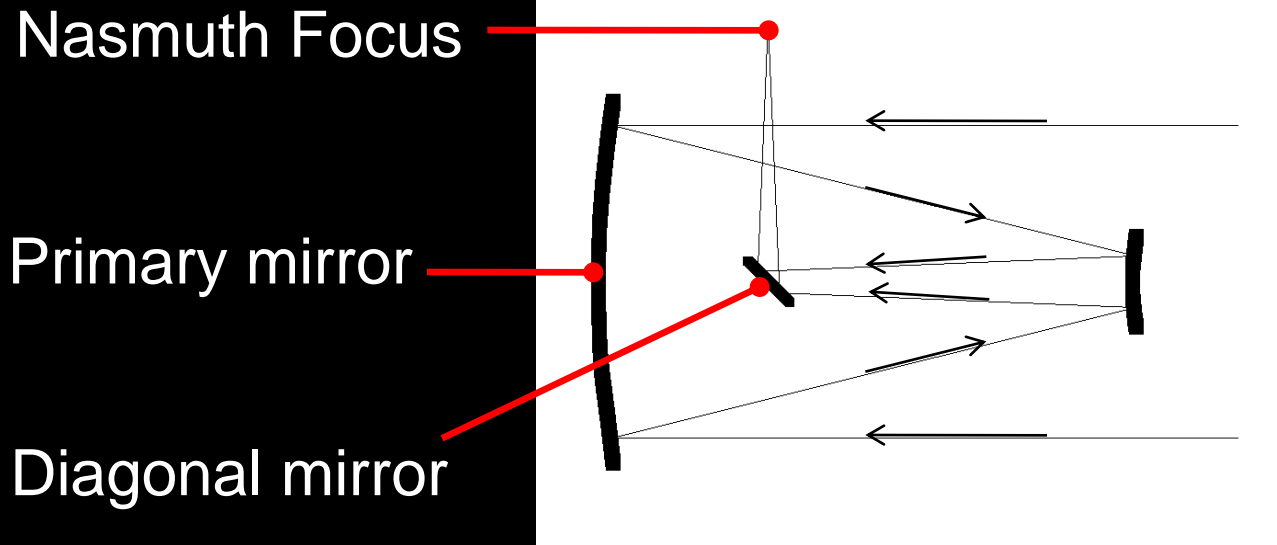


Secondary mirror

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