

Newtonian Collimation

Marc Feuerberg

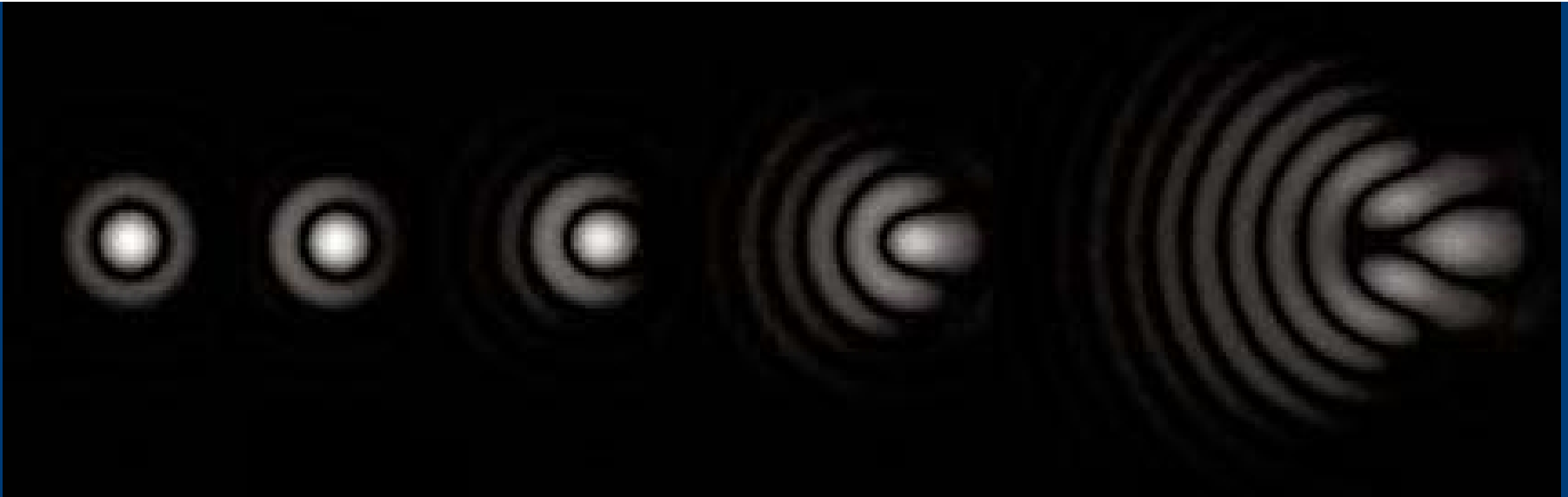
Rank, in order of importance, elements for high quality planetary views:

- A. Optical quality of eyepiece
- B. Optical quality of telescope
- C. Collimation of optics
- D. Steadiness of atmosphere (seeing)
- E. Thermal equilibrium of optics
- F. Using high-magnification eyepiece

Rank, in order of importance, elements for high quality planetary views:

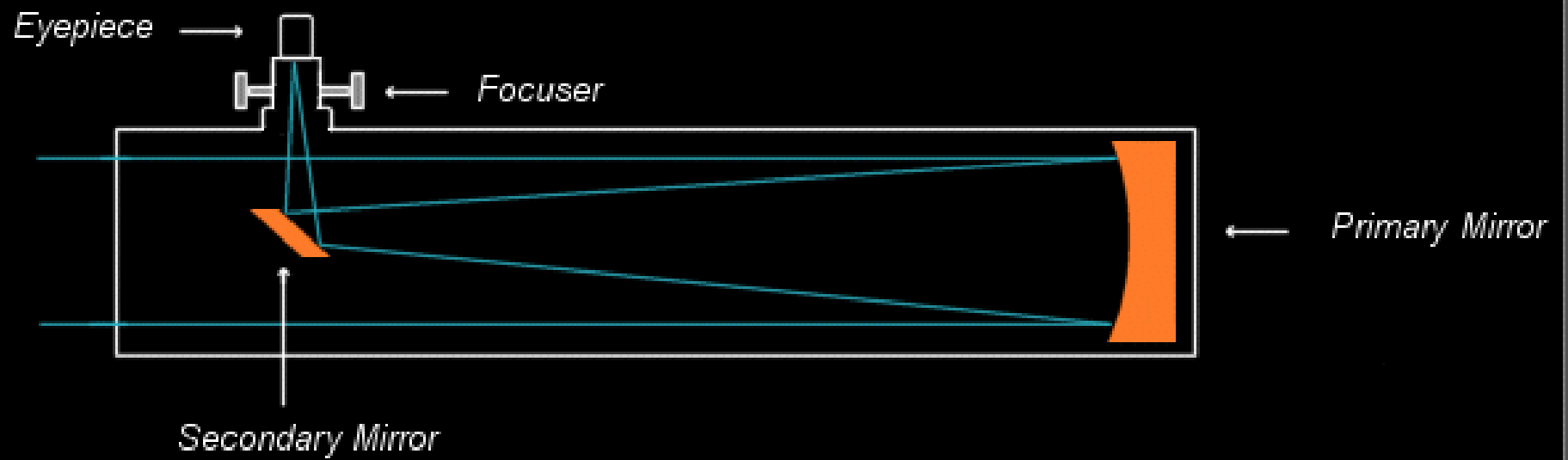
- A. Optical quality of eyepiece
- B. Optical quality of telescope
- C. Collimation of optics
- D. Steadiness of atmosphere (seeing)
- E. Thermal equilibrium of optics
- F. Using high-magnification eyepiece

Answer: reverse order

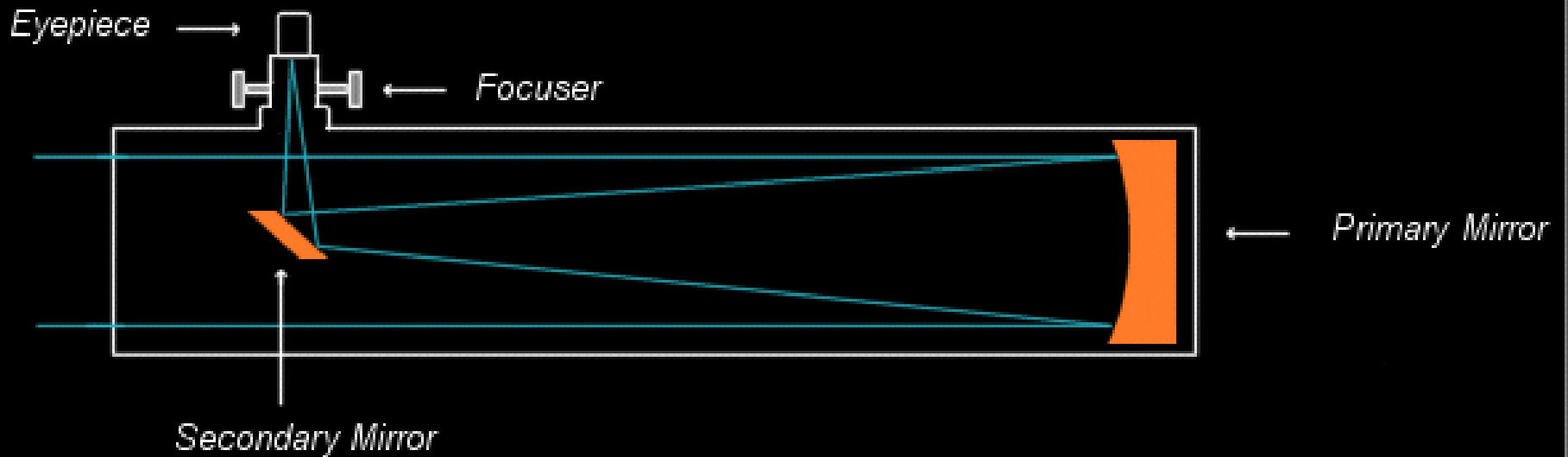


- Coma-free diameter at focal plane is equal to focal ratio, cubed, times .022
 - $F10 = (10^3) * .022 = 22\text{mm}$
 - $F5 = (5^3) * .022 = 2.8\text{mm}$
 - $F4 = (4^3) * .022 = 1.4\text{mm}$

Reflector



Reflector



3 Steps:

1. Align focuser with secondary
2. Align secondary with primary
3. Align primary with focuser

1. Align focuser with secondary

- Use single-beam laser
- Use cheshire
- Use long drawtube with pinhole

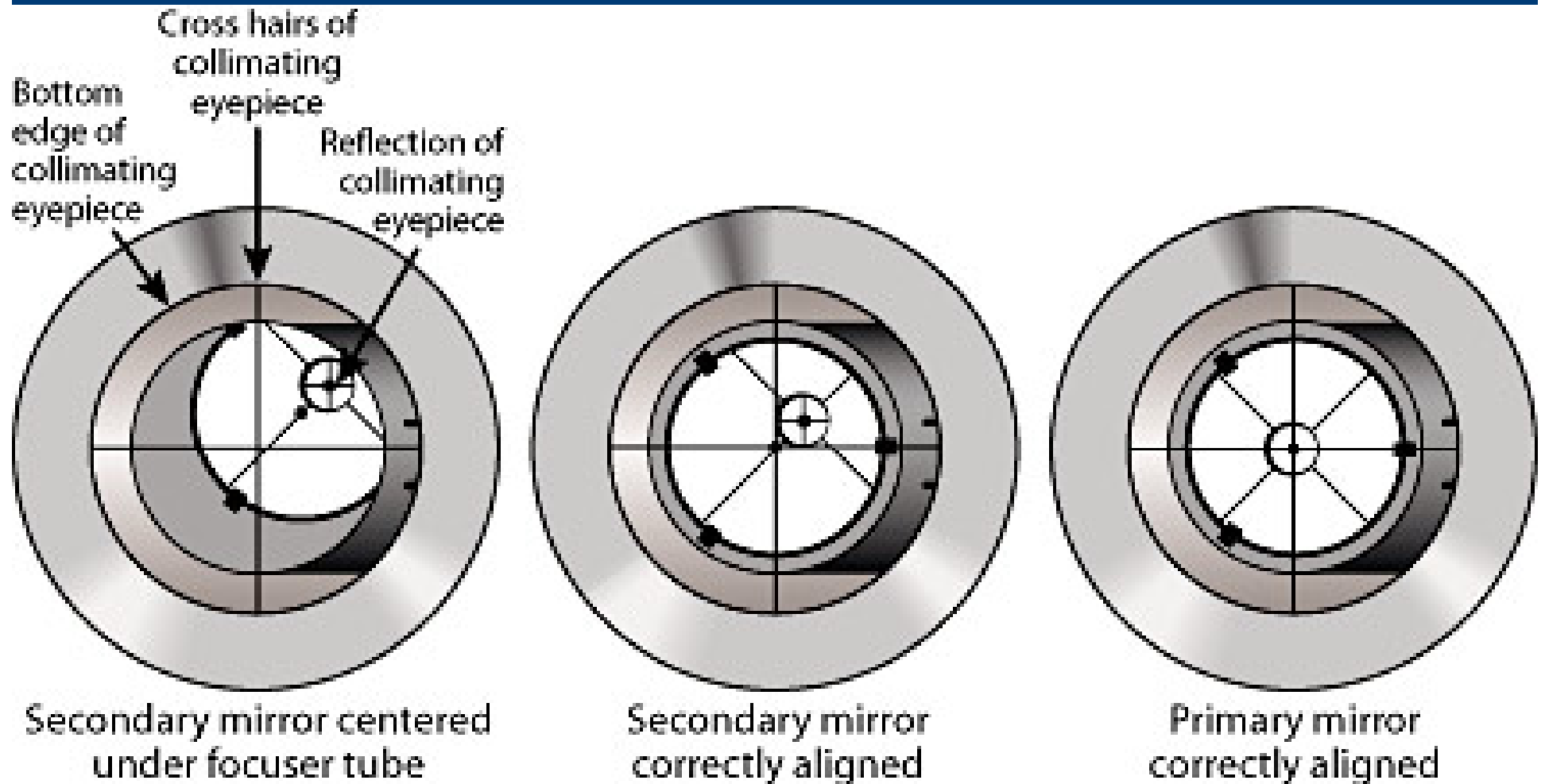
2. Align secondary with primary

- Laser – single beam point to center spot
- Cheshire – center whole primary

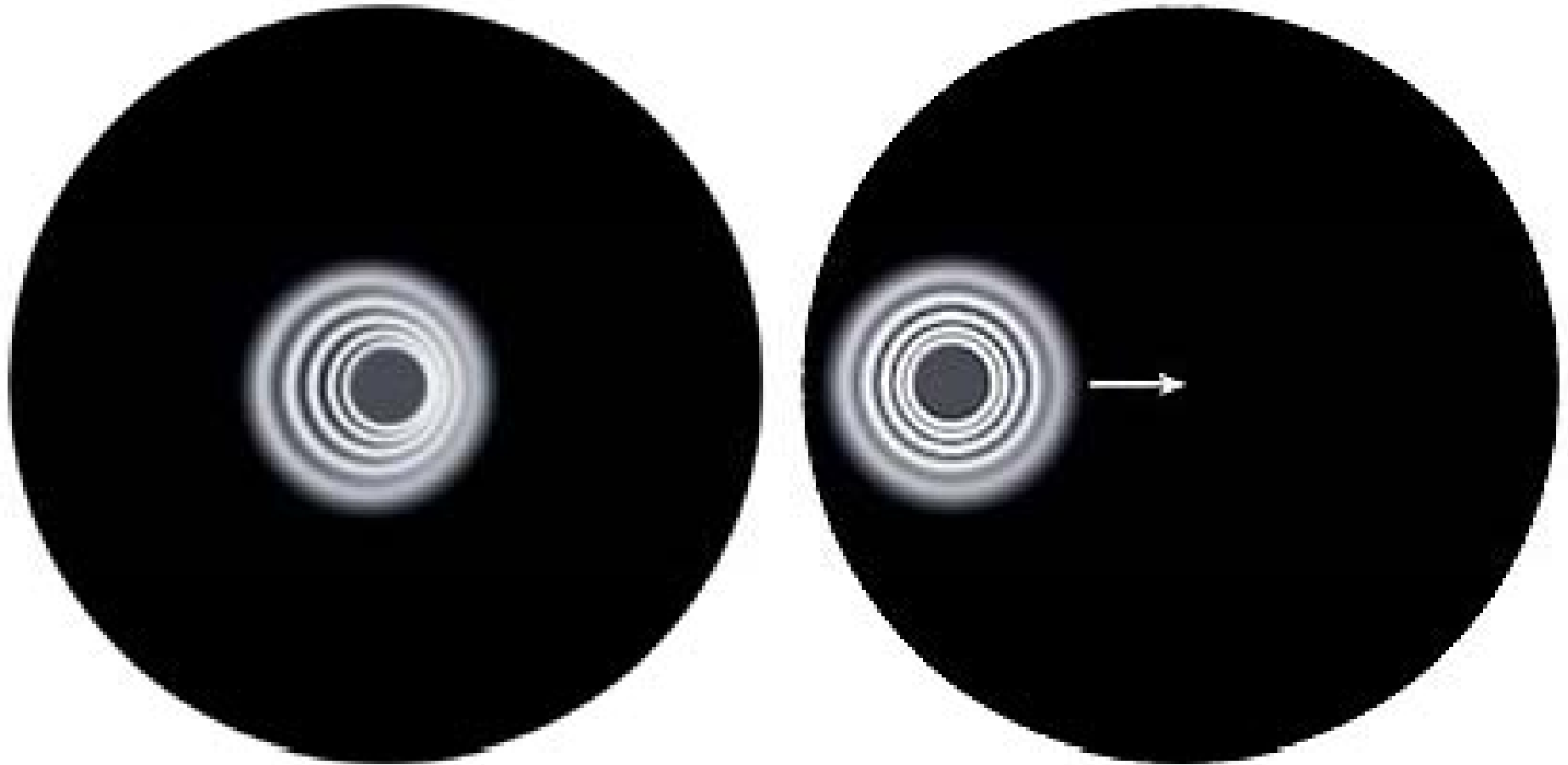
3. Align primary with focuser/eyepiece

- Laser – return single beam hits center of eyepiece (not recommended)
- Barlowed Laser – shadow of donut (center spot) hits center of eyepiece
- Cheshire – center return reflection of center spot/donut

Cheshire – all 3 steps



Step 3: manual adjustments



What's important?

- Step 1 alignment? No.
 - Step 2 alignment? No.
 - Step 3 alignment? Yes!
-
- Primary and secondary stable? Yes!

What's important?

- Using laser good for step 3? No.
 - Due to focuser/drawtube sensitivity
- Using barlowed laser for step 3? Yes!
- Using cheshire for step 3? Yes!

Other tips

- Check primary alignment (step 3) at
 - Multiple scope altitude positions
 - Multiple temperatures
- Can do a star test on Polaris as a double-check
- Proper collimation incorporates proper secondary offset