

- 1 What is the diffraction-limited angular resolution of two 10 m telescopes separated by 85 m? What is the light-gathering power of the combination? Why is it more important to combine the two telescopes by interferometry rather than simply to “add” their light?

### ① diffraction limited angular resolution

That of combined telescopes is equal to one-dish telescope (aperture = distance of dishes)

If  $\lambda = 0.1\text{mm}$ , diffraction limit is

$$2.52 \times 10^5 \times \frac{1 \times 10^{-4}}{85} = 0.296 \text{ (arcsec)}$$

$$1.22 \times \frac{1 \times 10^{-4}}{85} = 1.435 \times 10^{-6} \text{ (radian)}$$



## ②Light gathering power

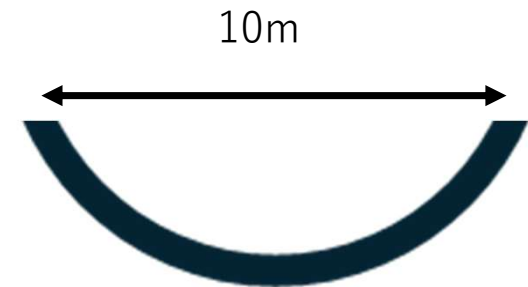
Aperture of naked eye: 7mm

The light gathering power of one-dish(10m aperture):

$$\left(\frac{10}{7 \times 10^{-3}}\right)^2 = \frac{10^8}{49} = 2.04 \times 10^6$$

Two dishes:

$$2.04 \times 10^6 \times 2 = 4.08 \times 10^6$$



“Combination” can realize higher angular resolution and light gathering power than “adding”