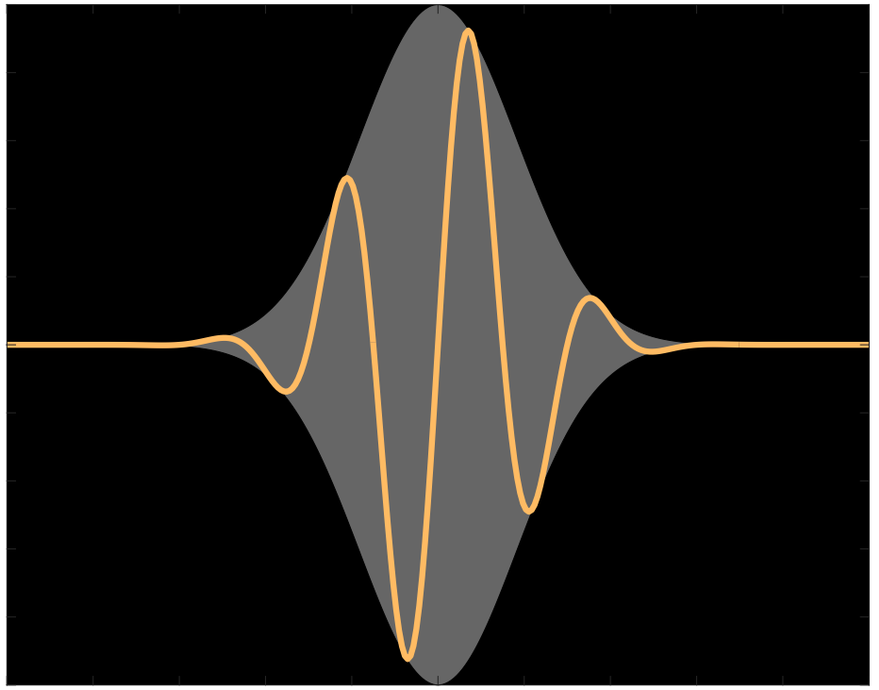
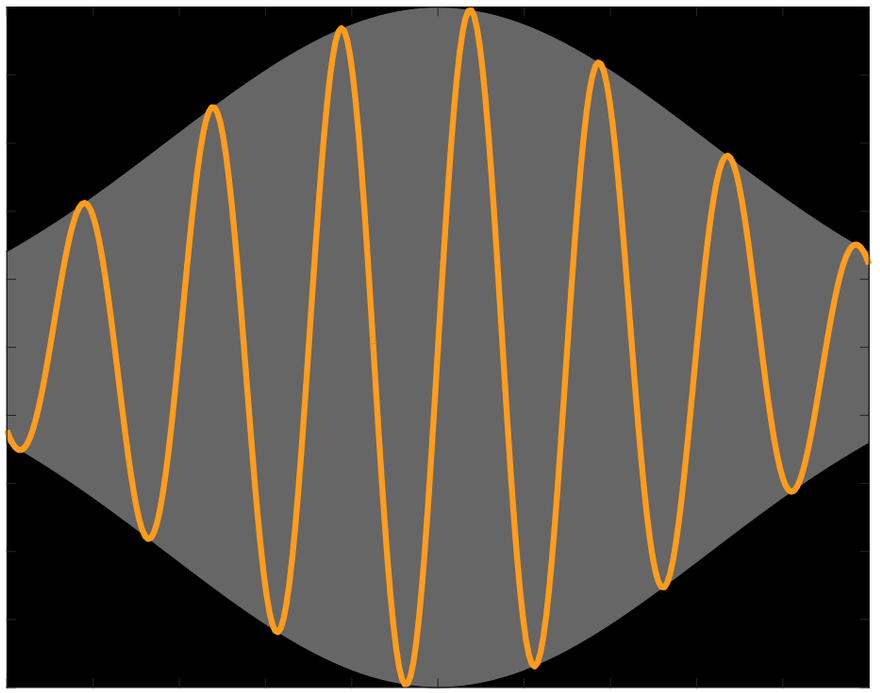
Looking at the stars

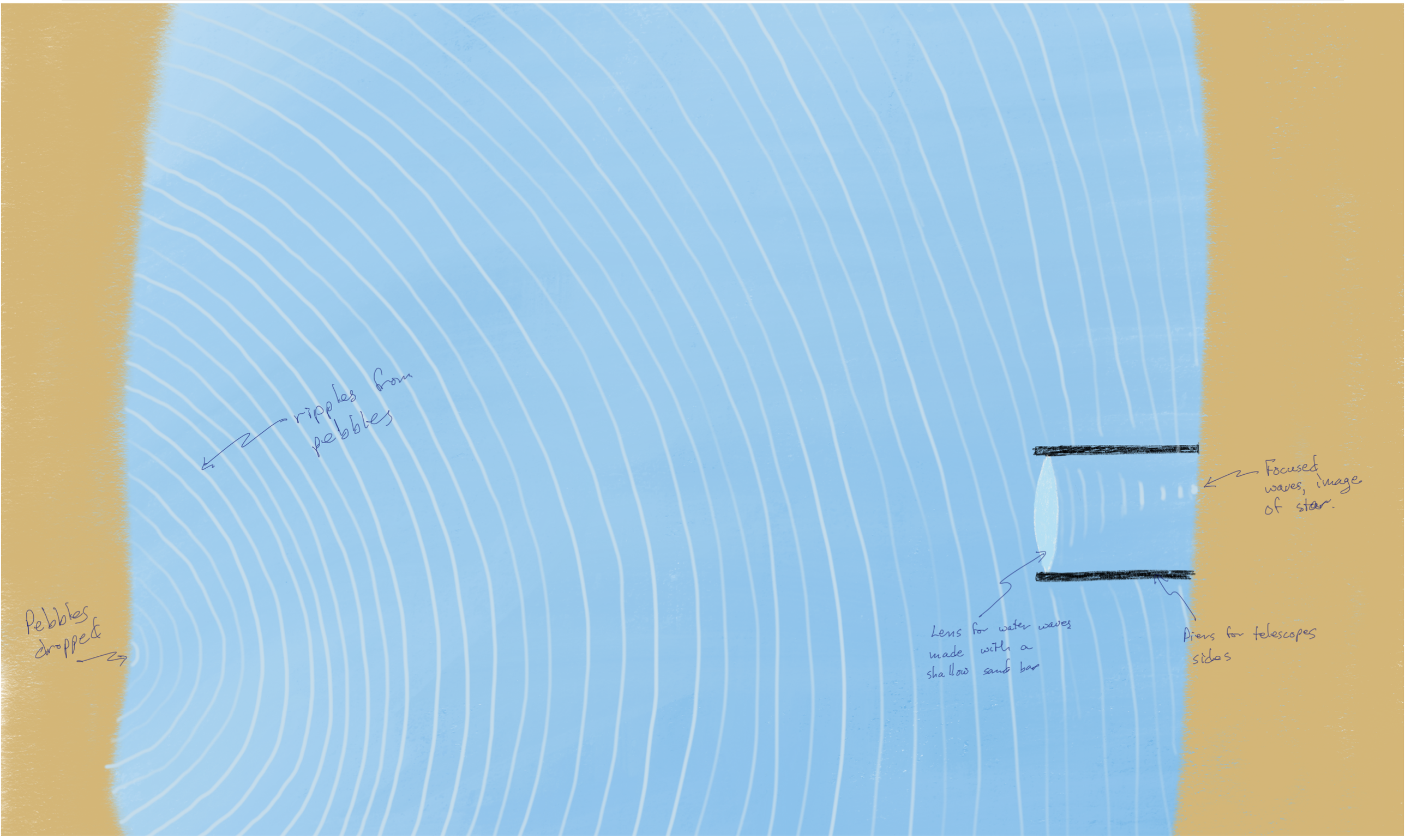
Last week: length of a ripple



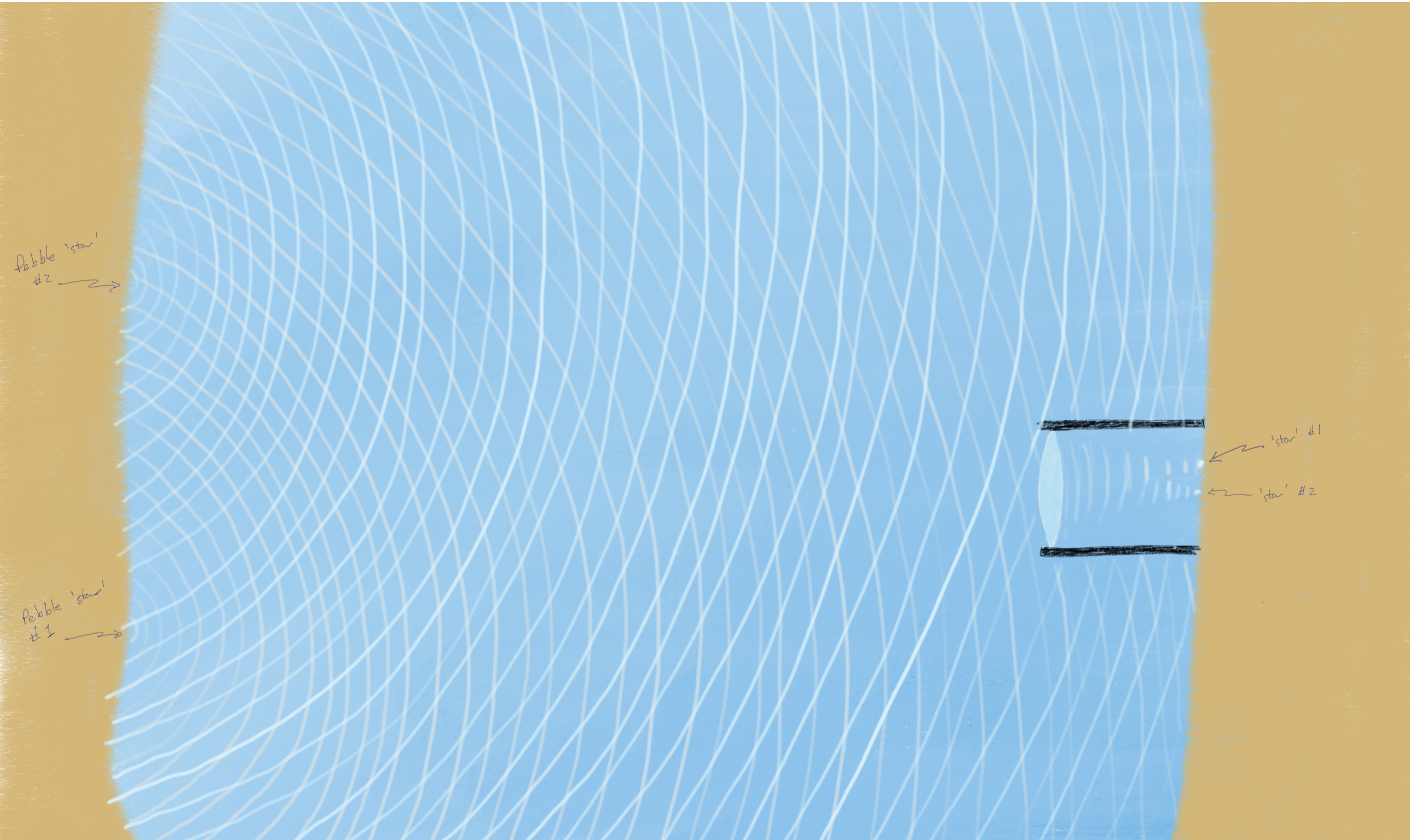


This week: how wide is a particle ripple?

Dropping pebbles in a pond



Telescope ‘sorts’ the light into two spots



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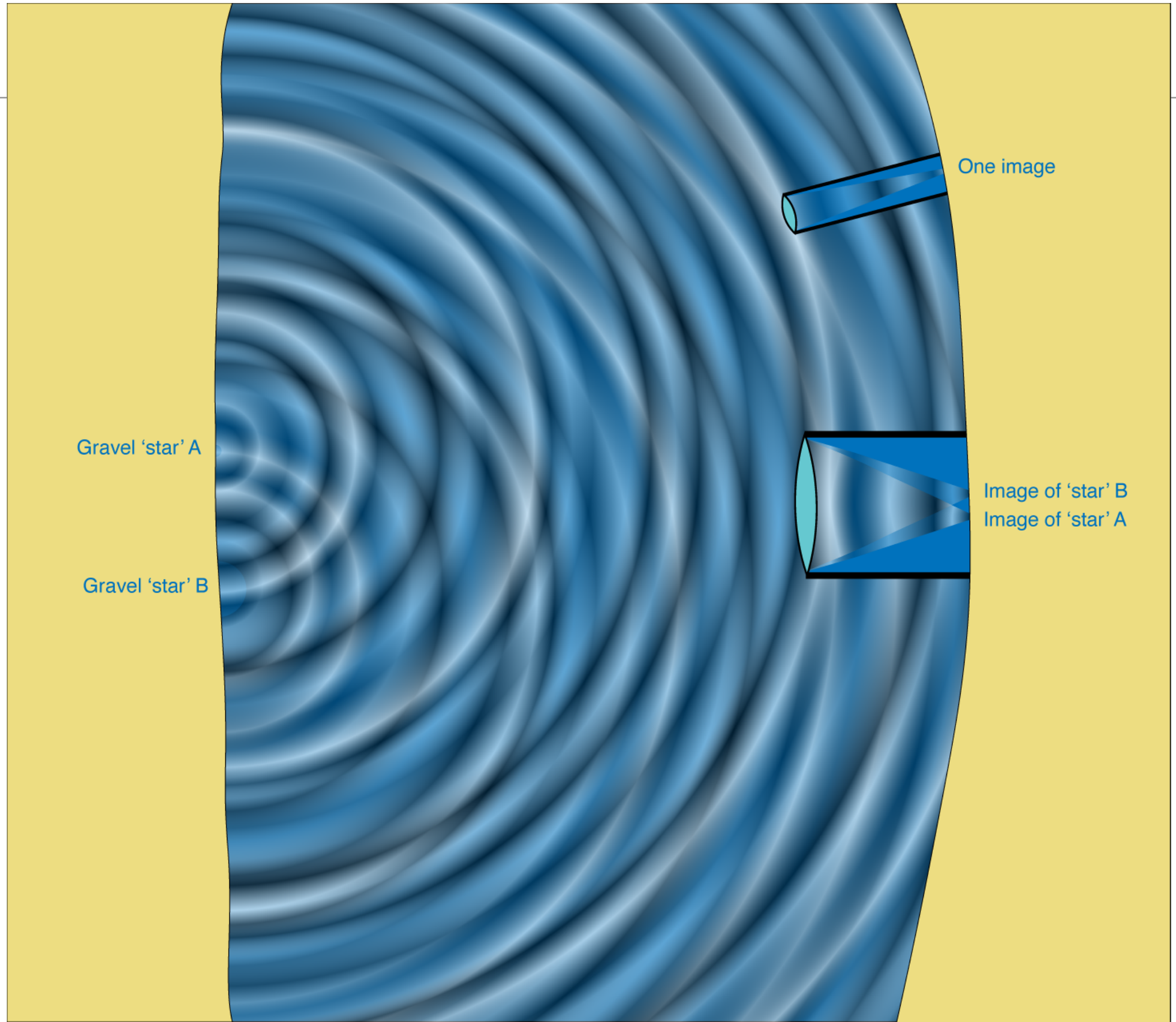
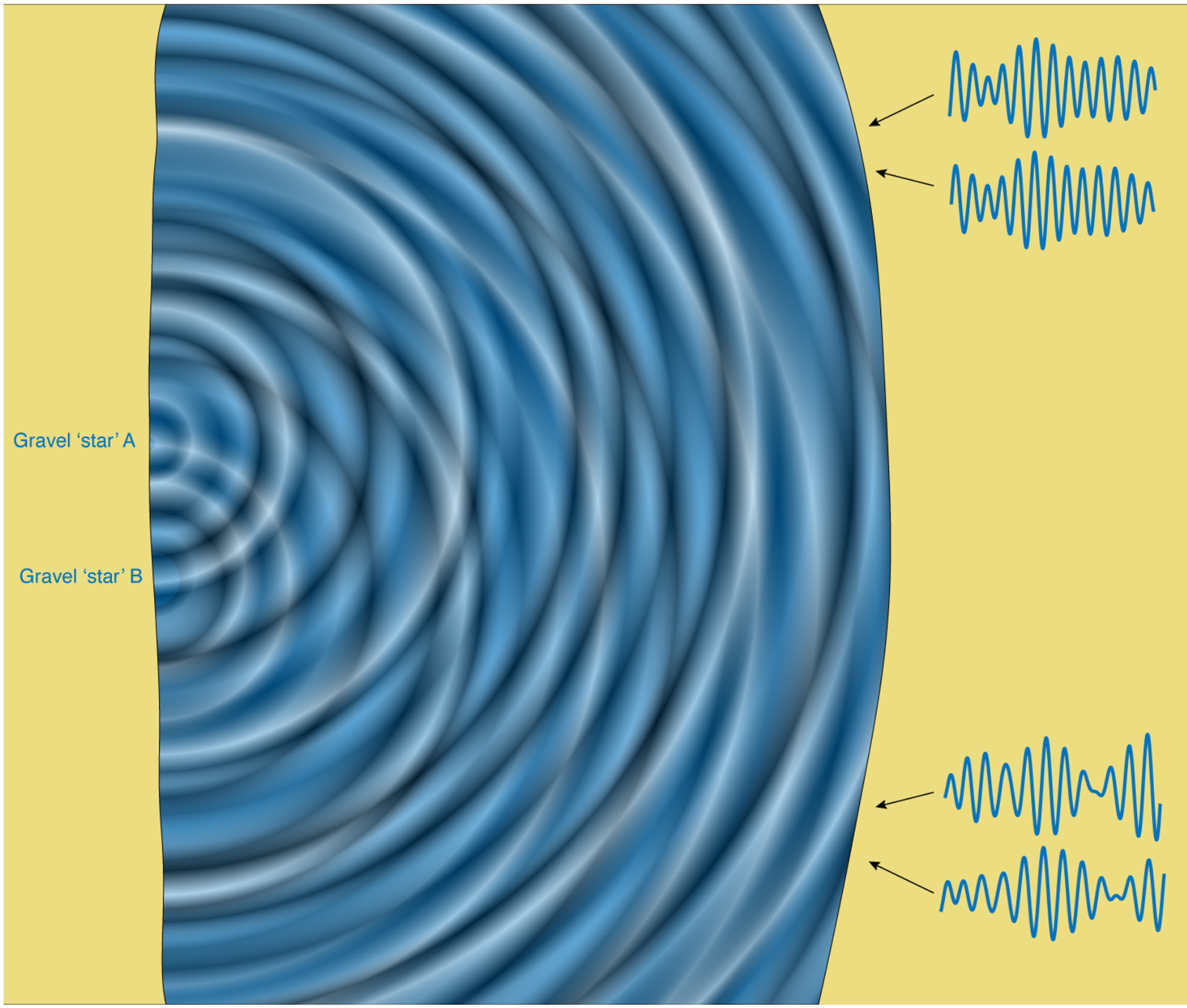


Combined ripple

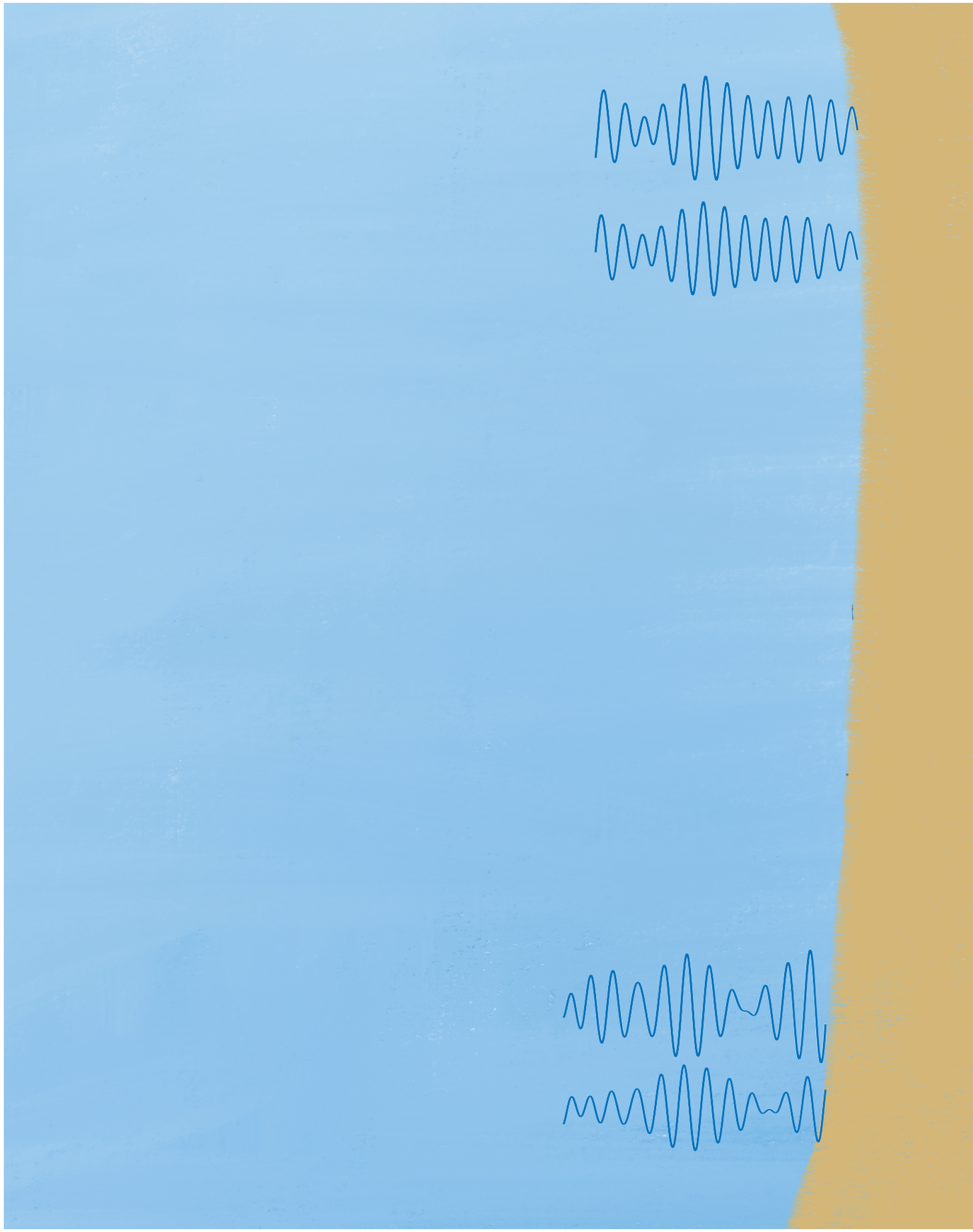
- Any two places near on the beach see very similar wave train
- Any two places far apart see very different wave train



Combined ripple

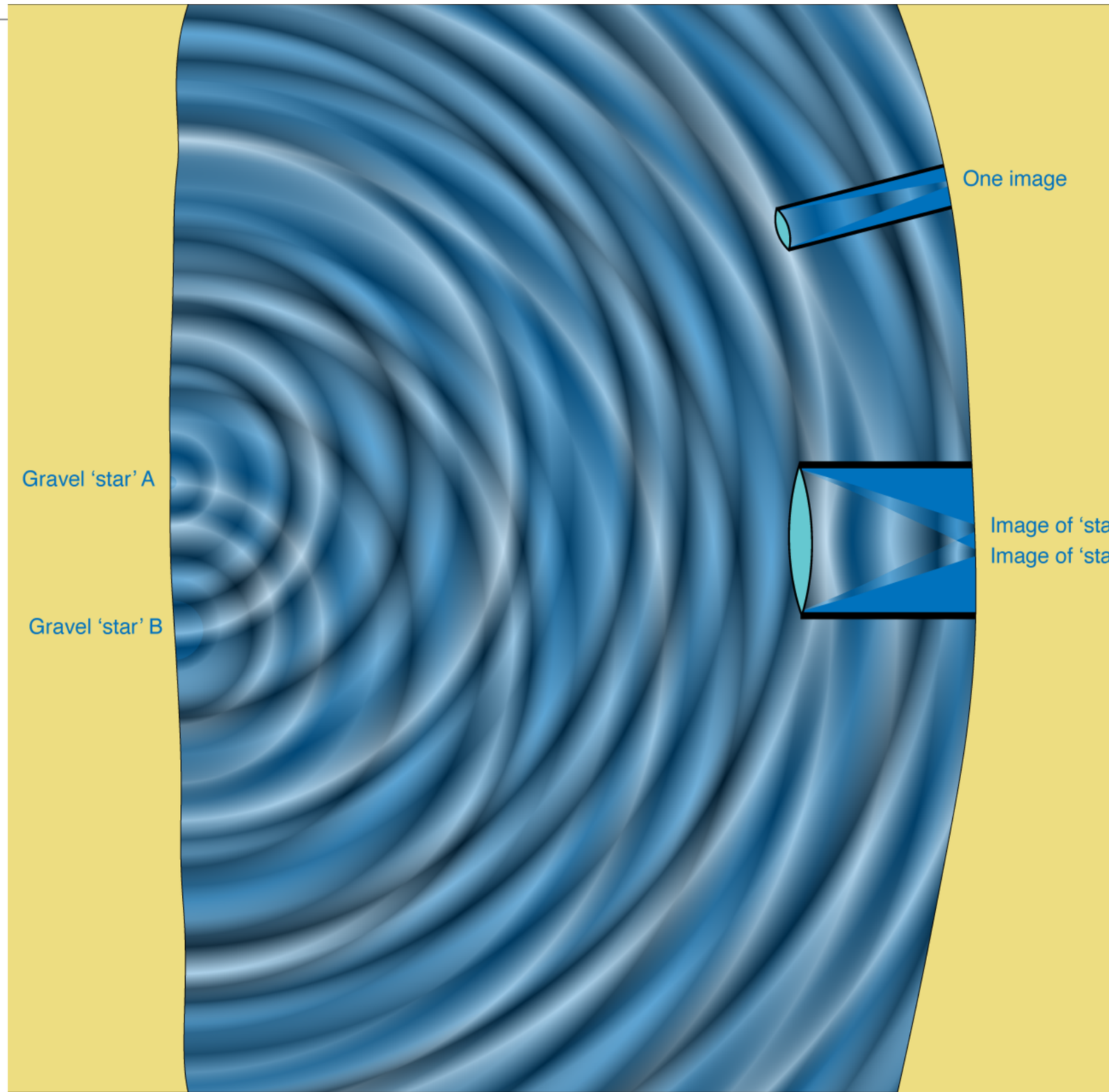
- If sources are close together, we need to walk a long way for the combined ripples to look different

- If sources are far apart, we don’t need to walk very far for the ripples to look different



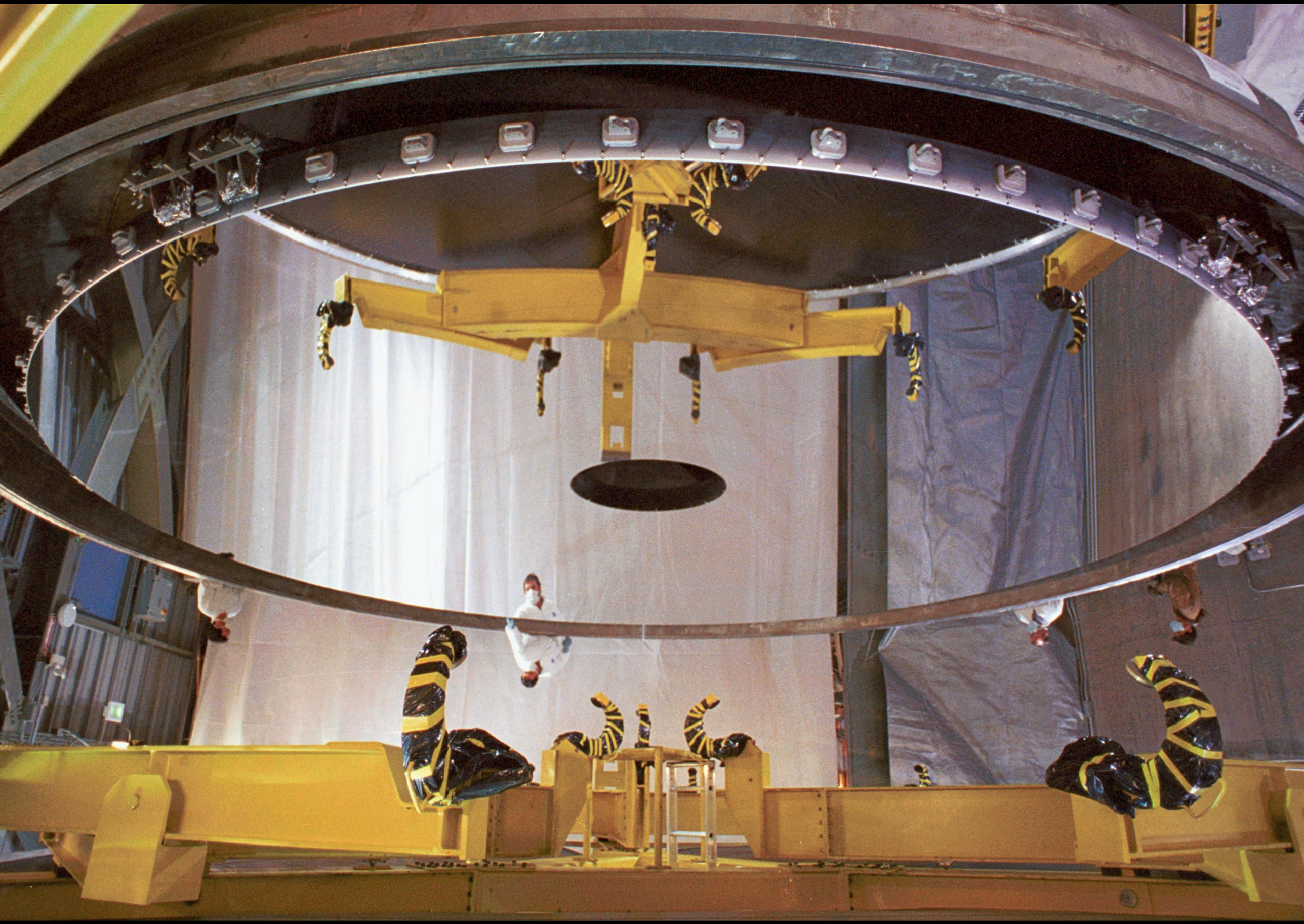
Telescope resolution

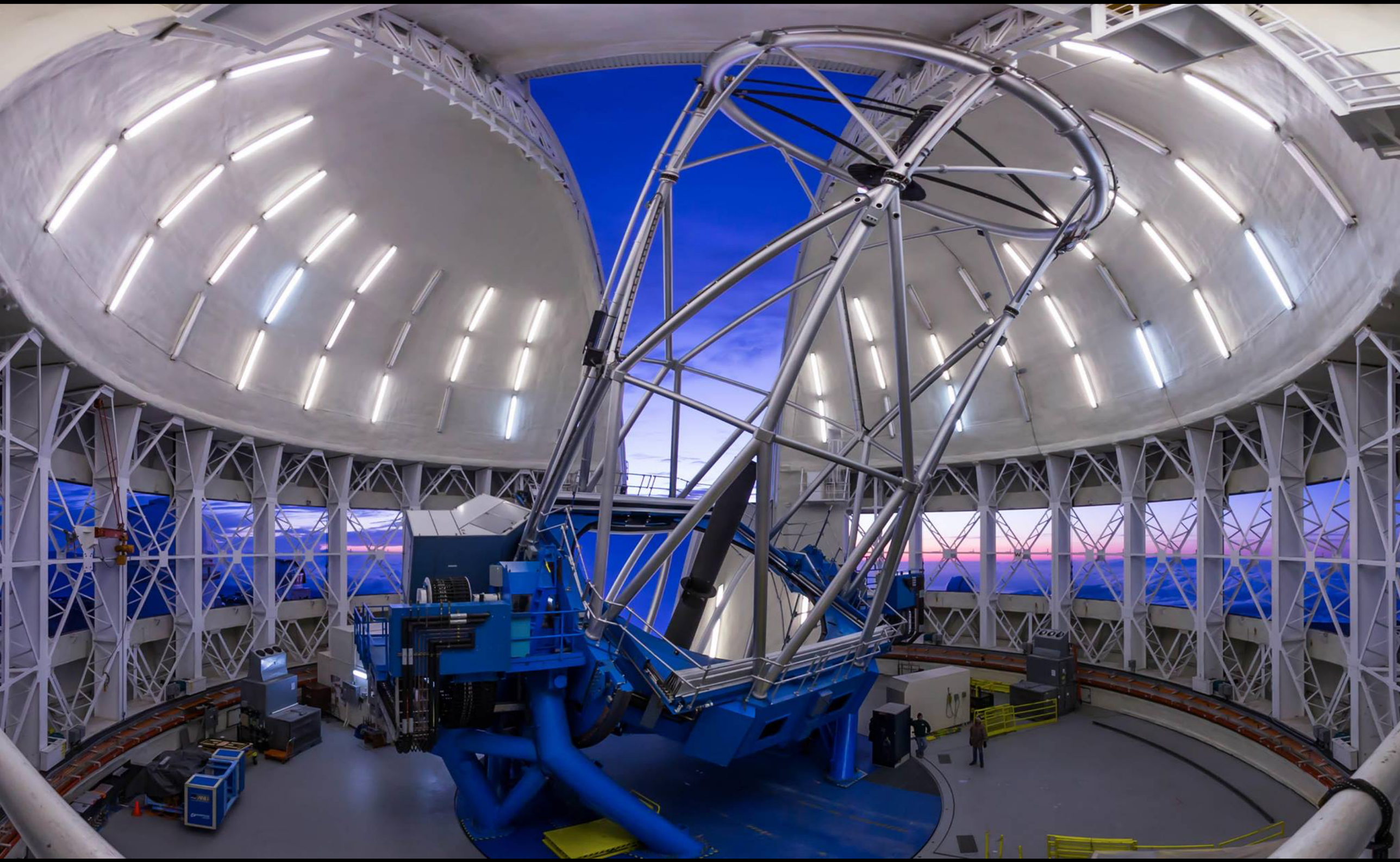
- **If waves look different at different edges of the telescope, it can sort the light**
- **Bigger the telescope, the better the resolution (ability to sort)**



Bigger the telescope the better the resolution

- Always true in space
- True on the ground if atmospheric distortion can be corrected (adaptive optics)

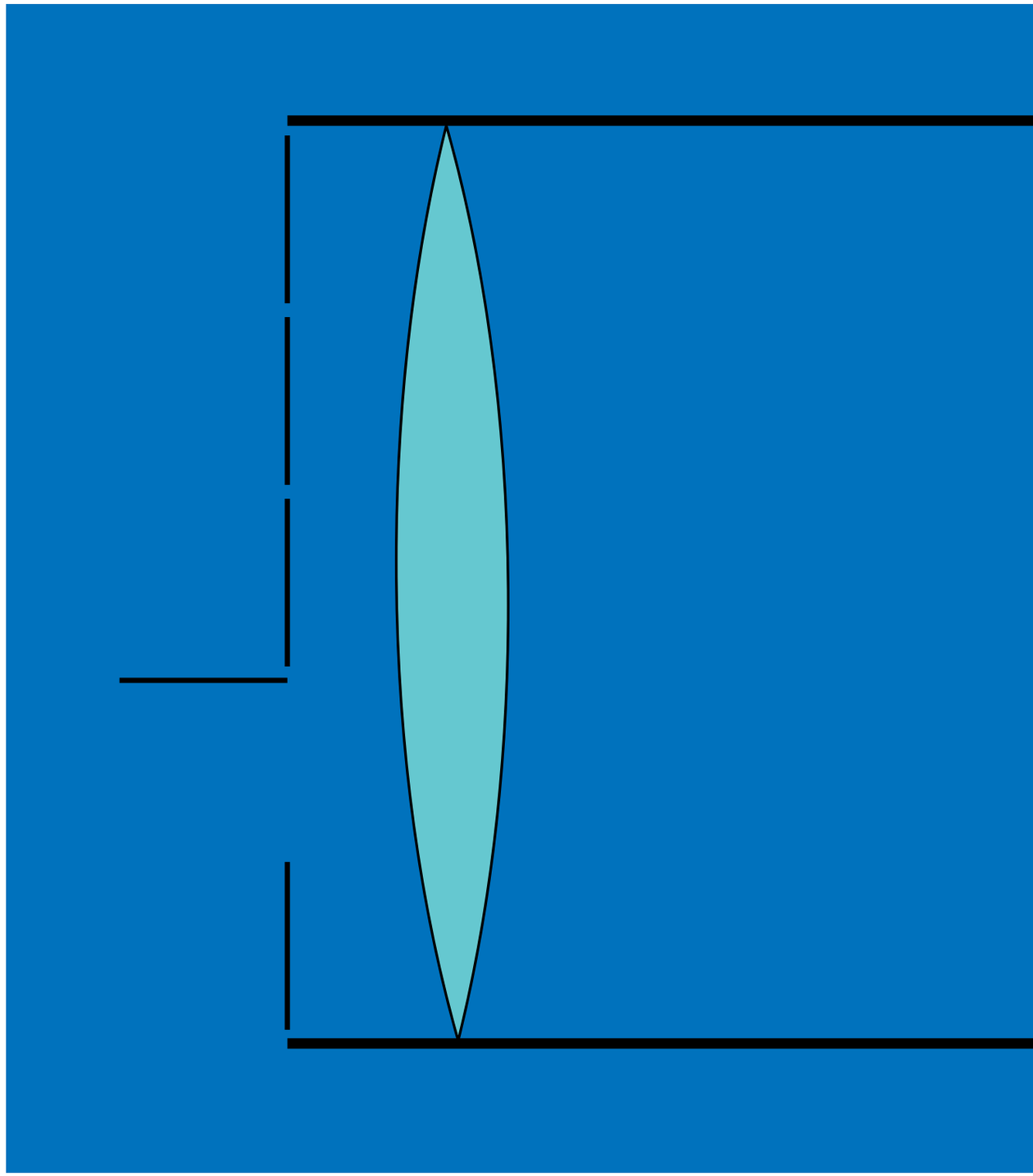




Where did the photon enter the telescope?

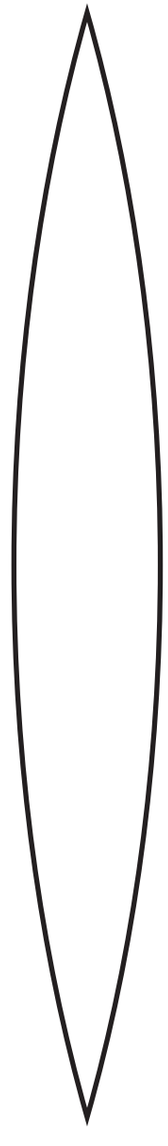
Put little doors in front, wait for a single photon to enter

- The image blurs!
- Image quality of a telescope the size of the little door.



Photon ripples are ***wide***

- Each photon ripple fills the entire telescope



You can see this…

“Why do I believe in quantum mechanics? Because I can clearly see the stars at night”