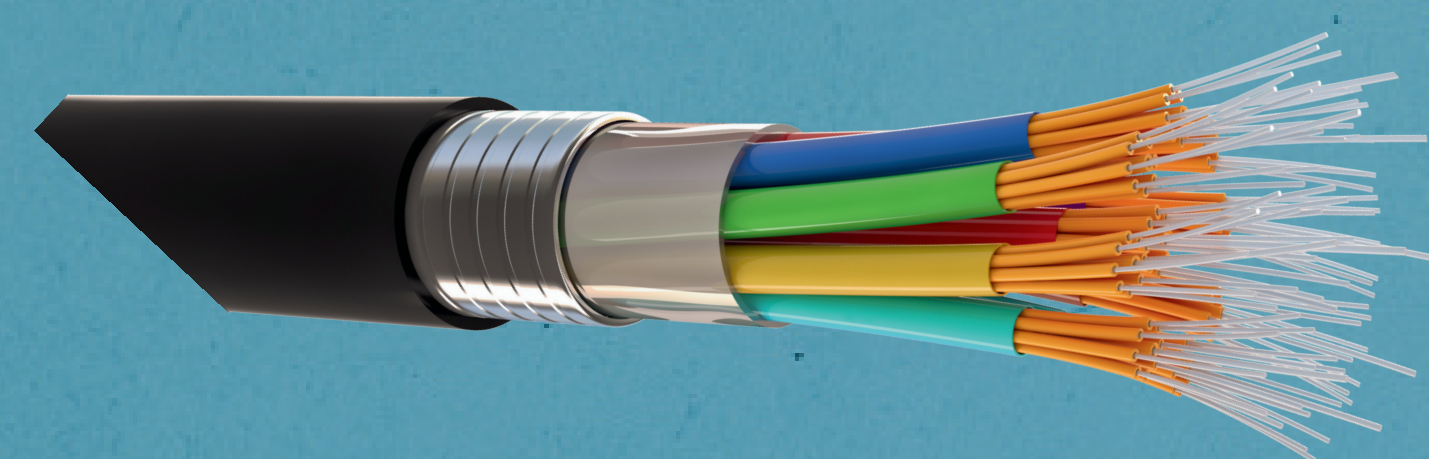


# Measure Turbine Blade Bending with Light!

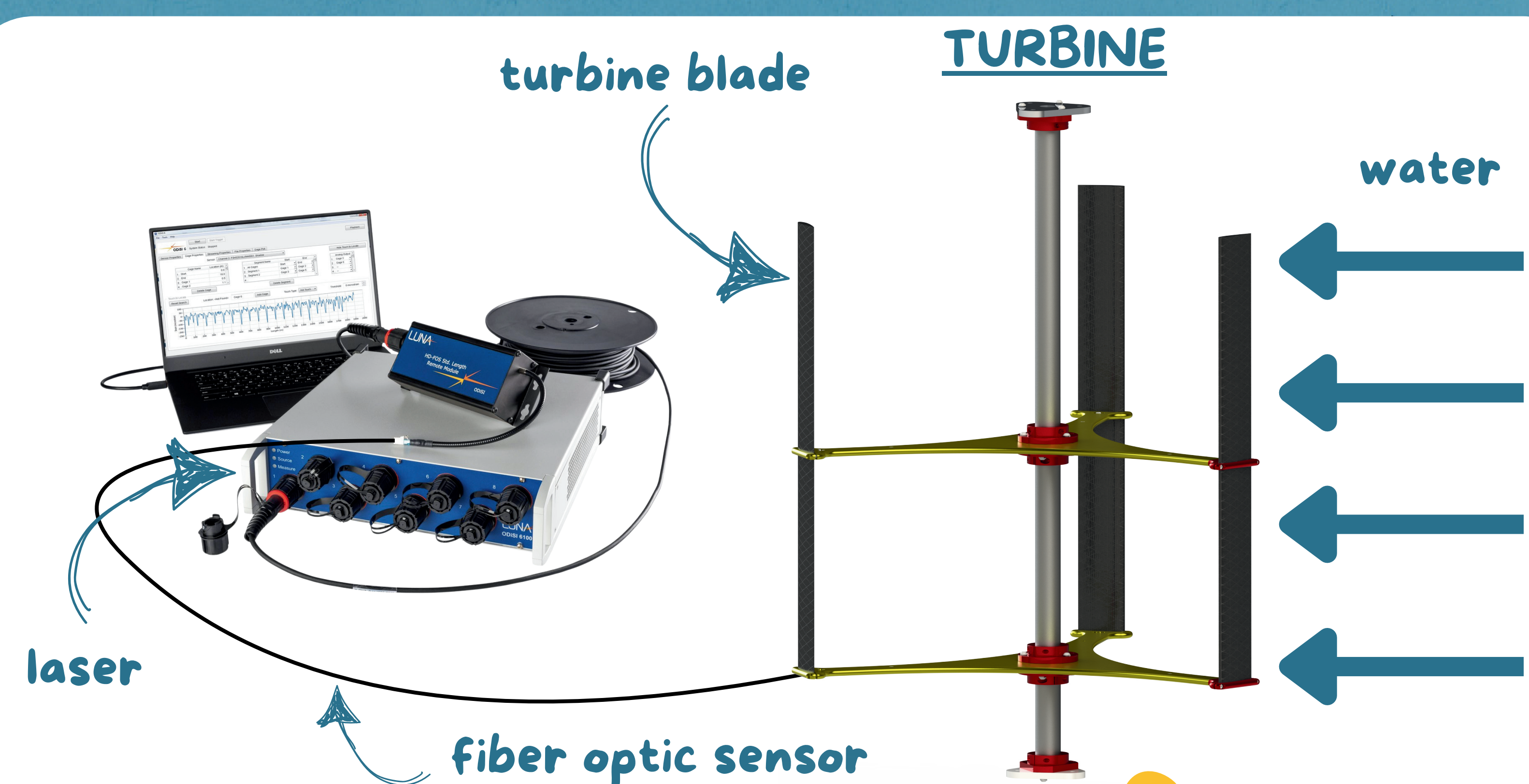
## What are fiber optics?

Fiber optics are tiny glass or plastic strands that transmit information using light! When I say tiny, I mean they are nearly the diameter of a single strand of human hair!



## How do we use fiber optic sensors in turbine blades?

1. When deployed underwater, turbine blades constantly "feel" pressure from water flowing past them.
2. A single fiber optic sensor is embedded in the turbine blade to allow us to measure how much the blade bends by taking strain measurements.

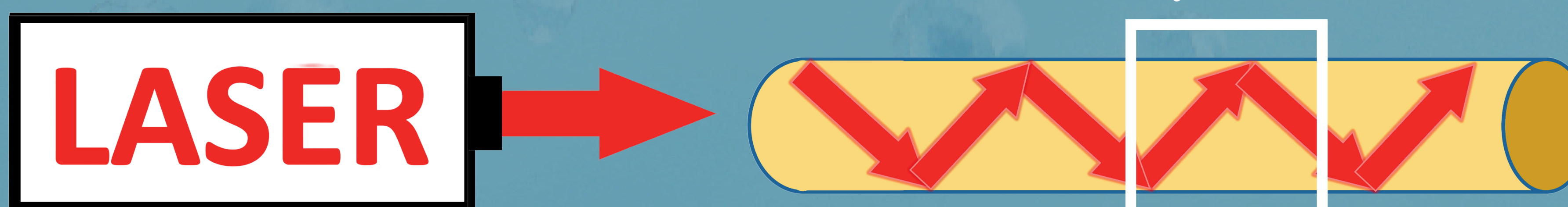


### Questions to ask!

1. Why is measuring turbine blade bending important?
2. How can we use light to measure blade bending?
3. How do we know the backscatter changed when the fiber bends?
4. How small are the fibers?
5. How are the fibers embedded in a blade?

## How do fiber optic sensors work?

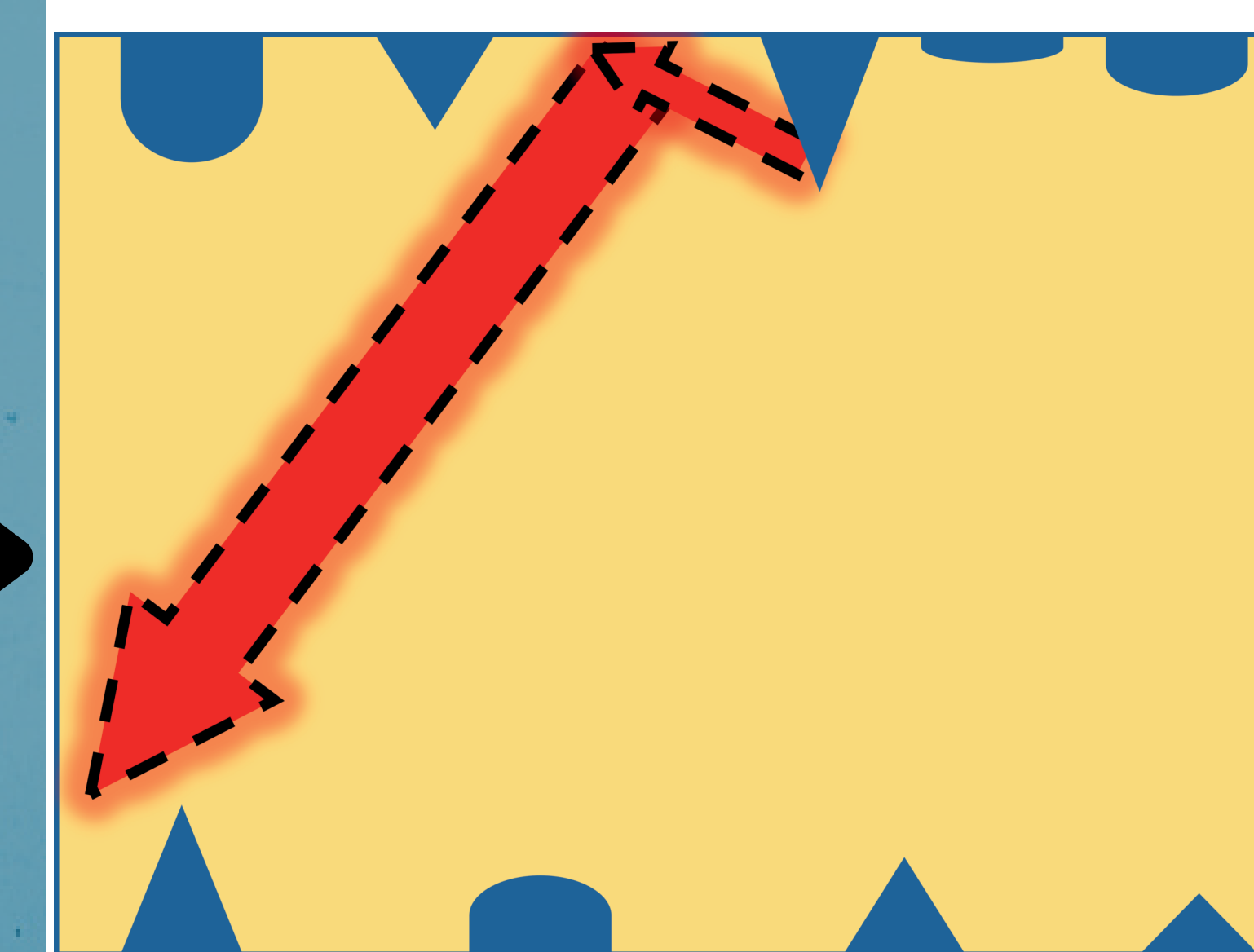
1. Light is sent out from a laser...
2. through a tiny glass strand (fiber) that is in our blade!



3. Light hits BUMPY WALLS.



4. Some light BOUNCES BACK.

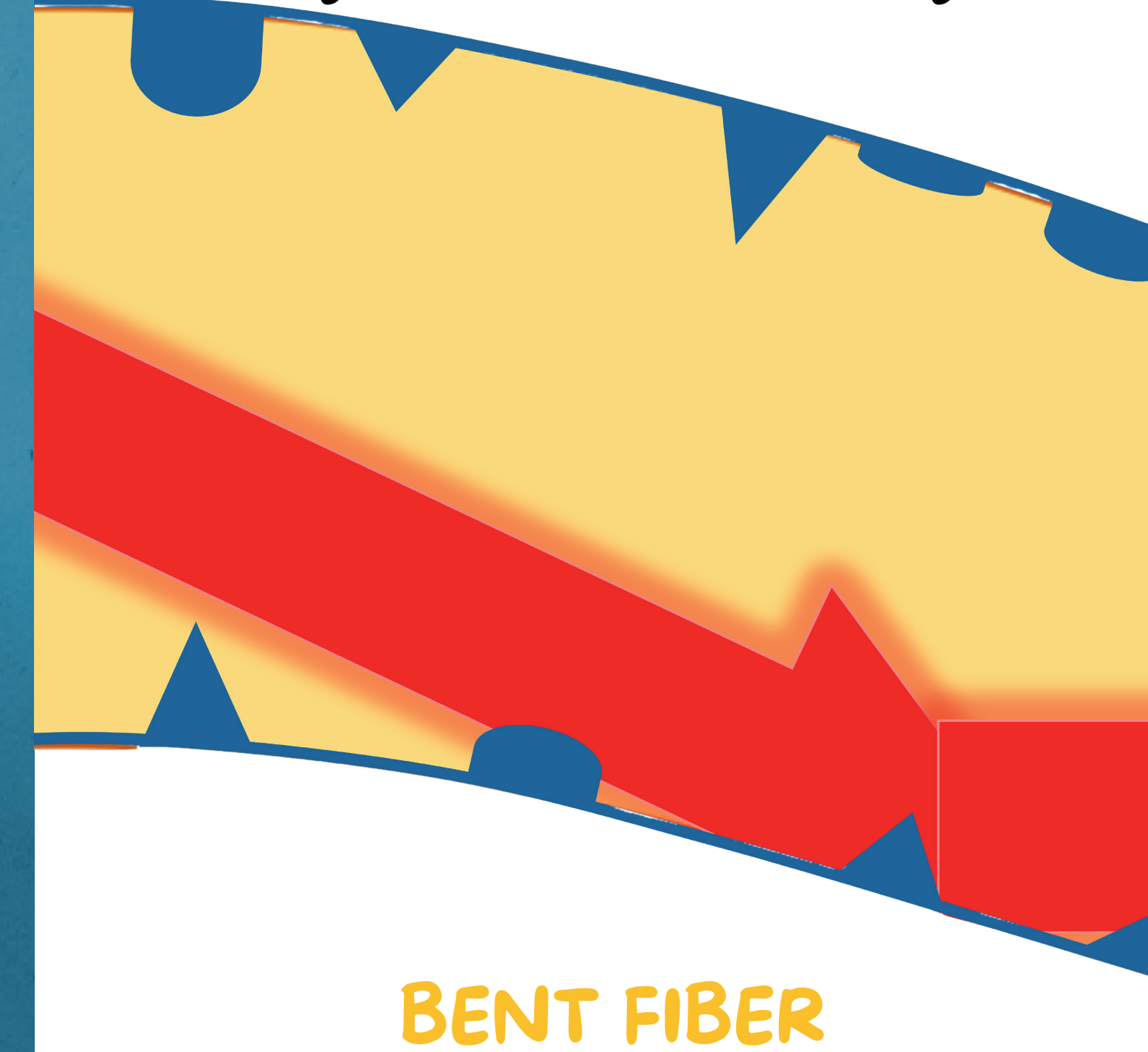


time

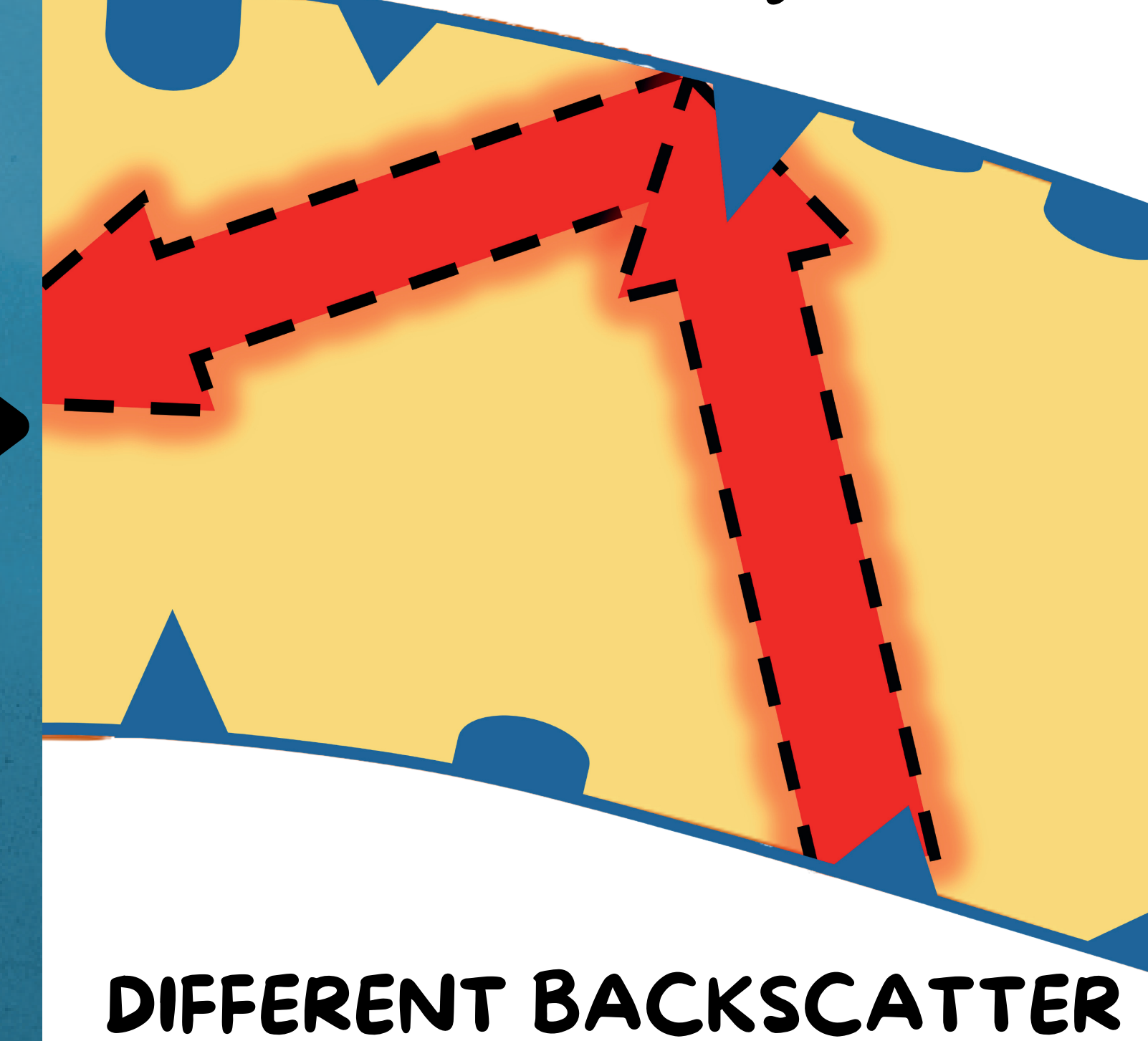
5. But when light is sent through a fiber that bends with the blade from an external force...



6. ...the way light travels through the fiber changes...



7. ...so the way light BOUNCES BACK changes.



time

The different backscatter from bending can be compared to the reference backscatter. We can make that difference mean something to us with a little bit of math and knowing the speed of light in glass!

