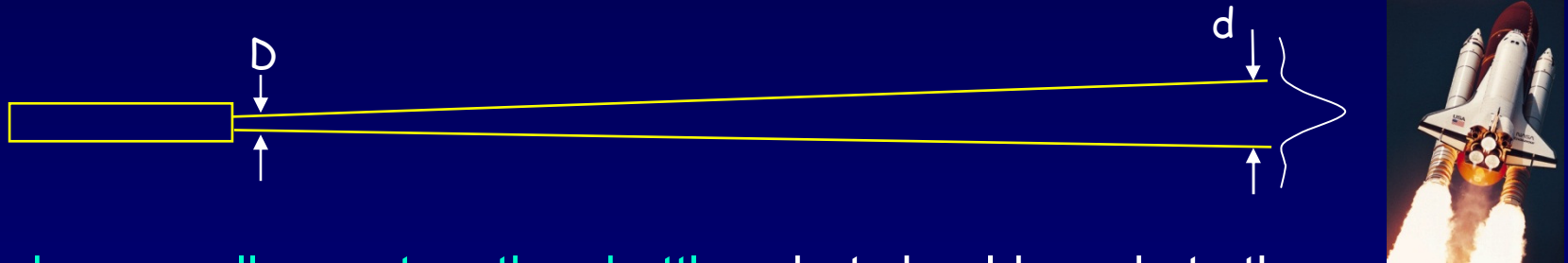


Solution

In 1985, a laser beam with a wavelength of $\lambda = 500$ nm was fired from the earth and reflected off the space shuttle Discovery, in orbit at a distance of $L = 350$ km away from the laser.



To make a smaller spot on the shuttle, what should we do to the beam diameter at the source?

- a. reduce it **b. increase it** c. cannot be made smaller

Counter-intuitive as this is, it is correct – you reduce beam divergence by using a bigger beam. (Note: this will work as long as $D < d$.)

We'll see that this can be understood as a non-quantum version of the uncertainty principle: $\Delta x \Delta p_x > \hbar$.