

Factors affecting the fringe separation (x) and the brightness of the fringes.

① The distance (D) b/w the double slit and the screen is **increased**, while all other factors stay unchanged.

• $\uparrow x = \frac{\lambda D}{a} \uparrow \therefore x$ increases i.e. fringe separation increases

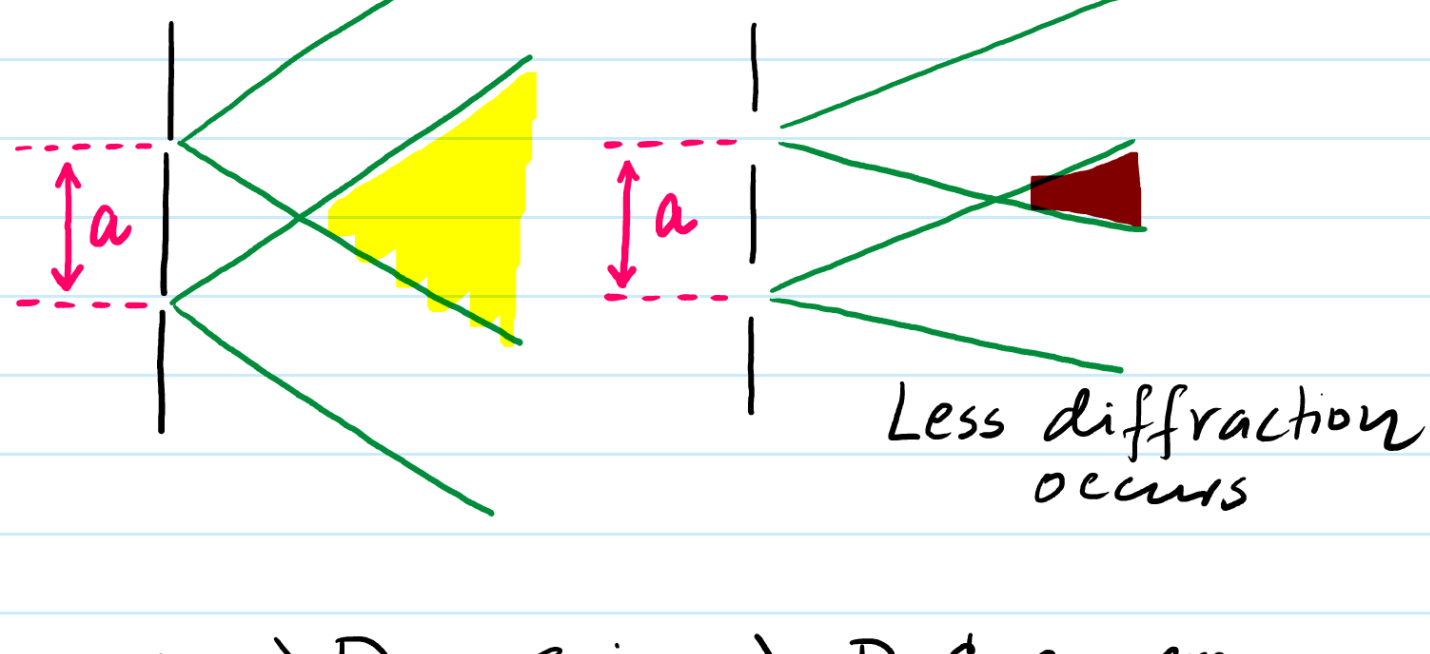
• Since $I \propto \frac{1}{d^2}$ \therefore as distance increases, the Intensity of Light falling on the screen will decrease hence fringes will be less bright.

② Light Source is now **replaced** with a Sound Source

• since $\lambda_{\text{sound}} > \lambda_{\text{light}} \therefore \uparrow x = \frac{\lambda D}{a}$ hence x increases

• Interference pattern will disappear Bright & Dark fringes will now be **replaced** by the term Loud Sound & Soft Sound / Zero Sound.

③ The **Size** of each **slit** is **increased** while keeping the slit separation (a), wavelength (λ) and distance (D) constant.



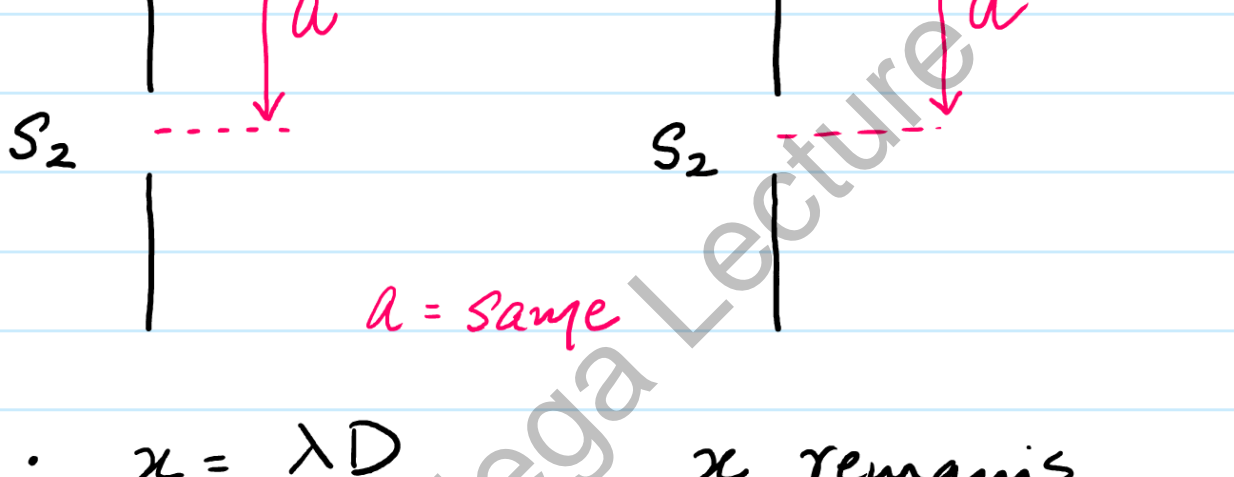
• $x = \frac{\lambda D}{a}$, since λ, D & a are all unchanged \therefore fringe separation x also remains unchanged

• Since Size of each slit is increased \therefore brightness of the fringes will also increase

• As slit size is increased, less diffraction occurs \therefore Interference pattern will now be observed over a limited Area / less # of fringes detected.

④ The Size of **only one slit** S_1 is increased, the size of the other slit S_2 is kept unchanged. Other factors slit separation (a), wavelength (λ) and distance (D) also kept unchanged.

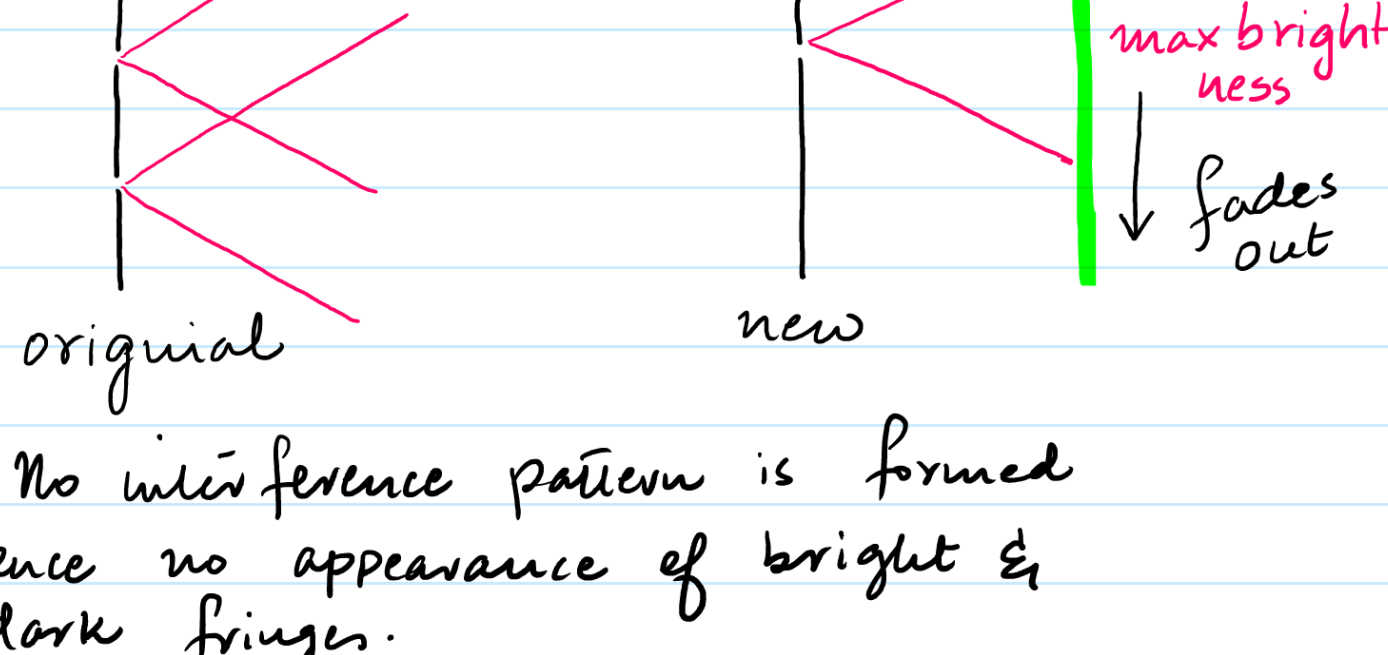
original vs new



• $x = \frac{\lambda D}{a}$ x remains unchanged

• The terms bright & dark fringes will now be replaced by the terms more bright and less bright fringes **stopped.**

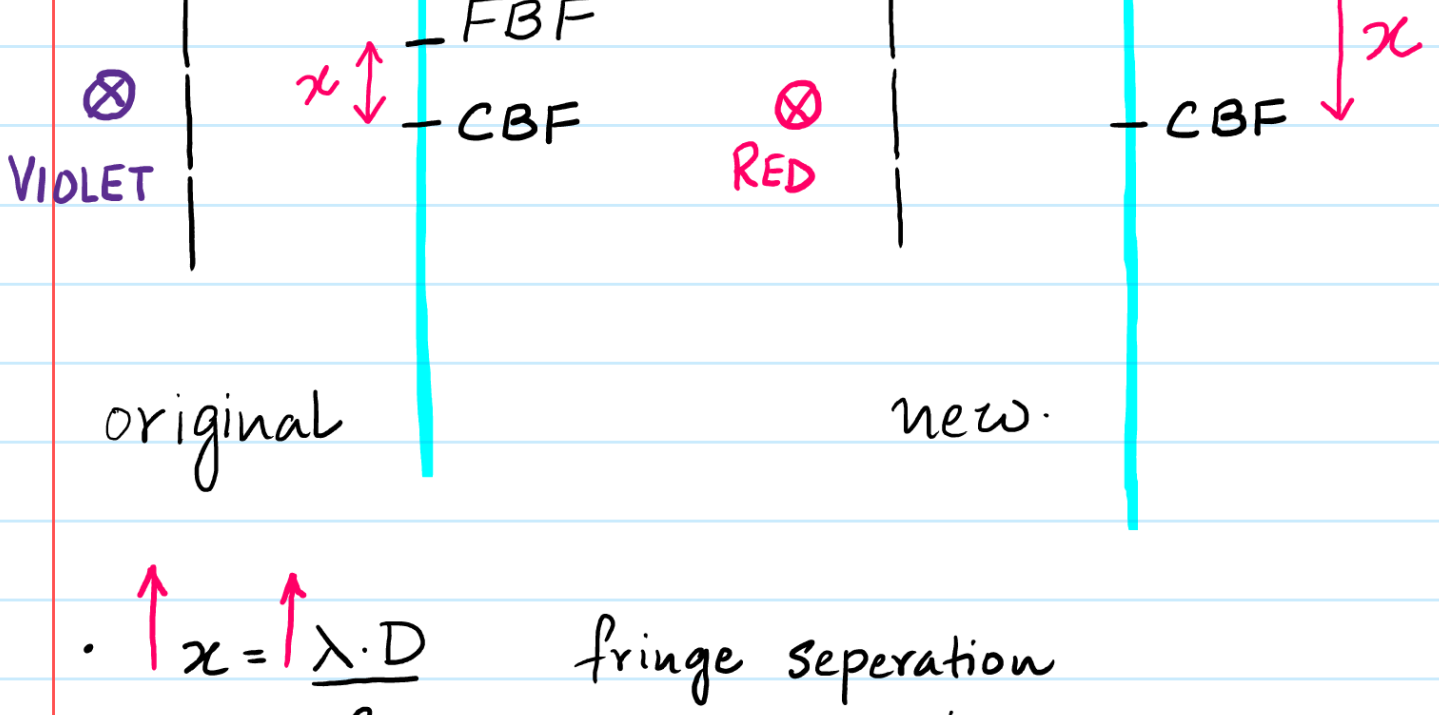
⑤ One of the slit is completely closed while the other slit is left unchanged.



• No interference pattern is formed hence no appearance of bright & dark fringes.

• A large area on the screen will be lit up & the intensity continues to fade as we approach the end of the screen on either side. $I \propto \frac{1}{d^2}$

⑥ The violet Light (400nm) is now replaced with a red light (700nm)



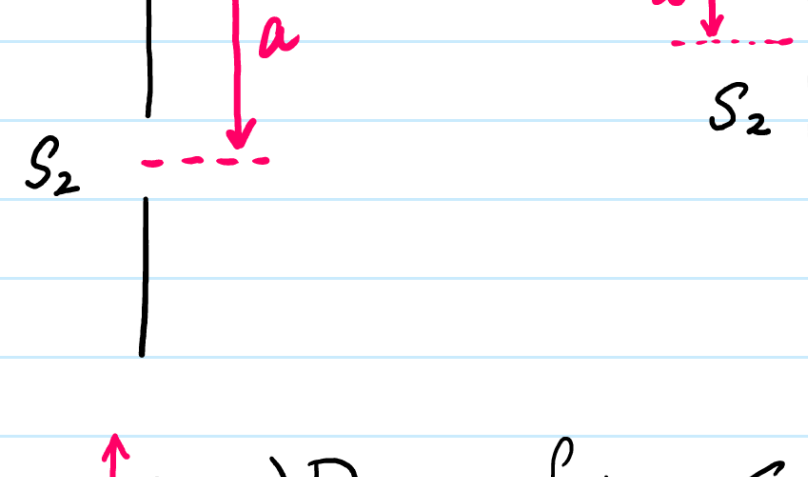
• $\uparrow x = \frac{\lambda \cdot D}{a}$ fringe separation x will increase

• C.B.F brightness constant
• FBF, SBF etc brightness marginally reduces.

(almost unchanged) naked eye difficult to judge a slight reduction in brightness.

• more diffraction in case of Red. (b/c $\lambda_{\text{red}} > \lambda_{\text{violet}}$)

⑦ The slit separation (a) is now reduced, while all other factors remain unchanged



• $\uparrow x = \frac{\lambda D}{a}$ fringe Sep x will increase

• CBF brightness unchanged
• FBF, SBF etc brightness marginally decreases or (almost constant) when viewed with