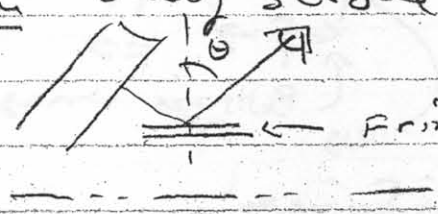
Interference Fringes

investigate $m = 2 n l \sigma \cos\theta$ — m = Integer or $(\mathrm{Int} + \frac{1}{2})$

fringe peak equation

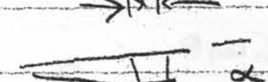
Fizeau — Study surface flatness

(A)



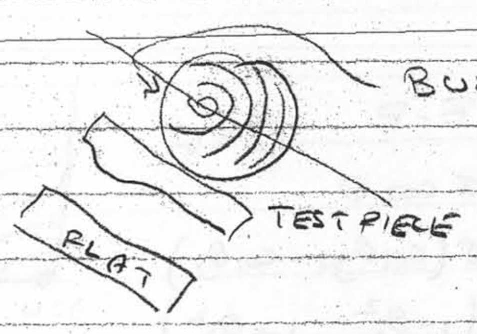
FLAT, wedged gaps

Contour lines
m = const. along a fringe



$\Delta m = 1 = 2 n \sigma \cos\theta \, \Delta l$ (Between fringes)

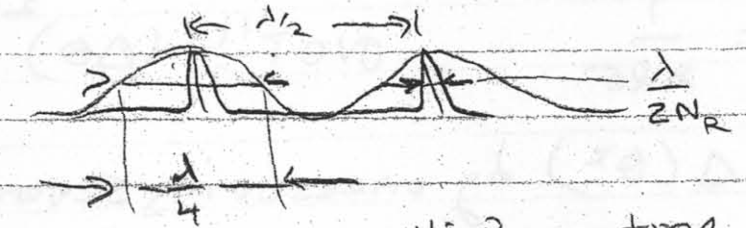
$$\Delta l = \frac{1}{2 n \sigma \cos\theta} = \frac{(\lambda / n \cos\theta)}{2}$$



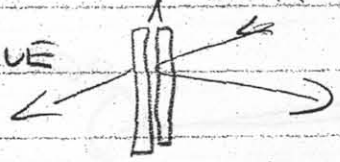
Hint: for m = const
$l \cos\theta$ = constant
change angle of view, and fringes move

- Also investigate fringe spacing: $\Delta l \sim \frac{1}{\cos\theta}$ ⇒ larger separation at large angles

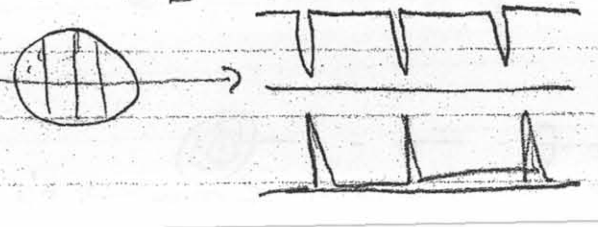
(B) Two Beam vs multiple beam



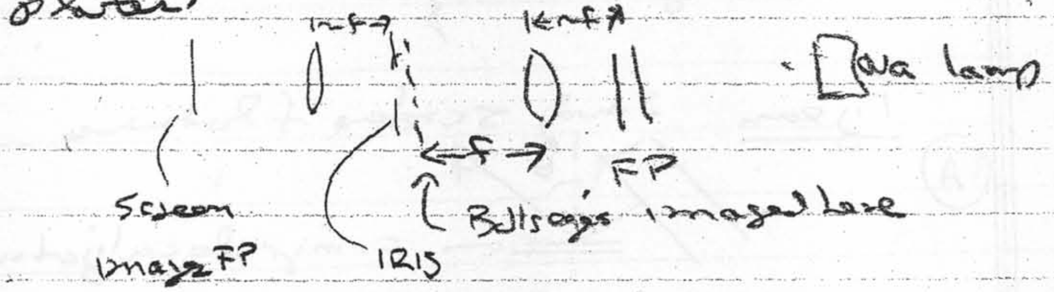
$N_R = \frac{\pi \sqrt{R}}{(1-R)} \approx 30$ for $R = 0.9$



OBSERVE in Transmitted & reflected light



C. Relationship between Bullseye fringes (at ∞) and Fizeau fringes (localized between plates.

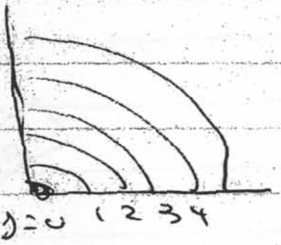


- see Fizeau fringes

OPEN & close IRIS - fringes get sharper + blurry.

$$\frac{\delta l}{l} = \frac{\delta \cos\theta}{\cos\theta} \simeq \frac{\theta^2}{2} \text{ near axis}$$

D. Measure F-P gap



$$m = 2nl\sigma\cos\theta$$

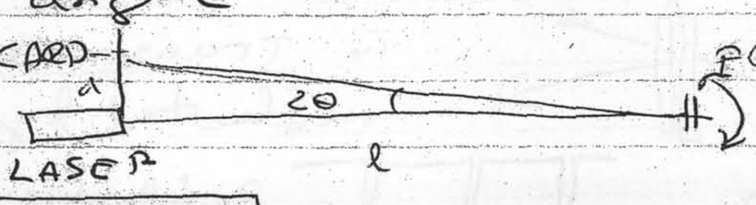
$$\Delta m = 1 = 2nl\sigma(\cos\theta_{j+1} - \cos\theta_j)$$

$$\simeq 2nl\sigma\left(1 - \frac{\theta_{j+1}^2}{2} - 1 + \frac{\theta_j^2}{2}\right)$$

$$= 2nl\sigma\left(\frac{\theta_j^2}{2} - \frac{\theta_{j+1}^2}{2}\right)$$

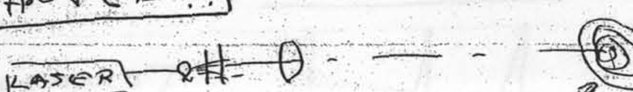
$$\Delta(\theta^2) = \frac{1}{nl\sigma} \quad \text{NOT!!! } (\Delta\theta)^2$$

measure $\Delta(\theta^2)$ by measuring several fringe angles



$$2\theta = \frac{d}{l}$$

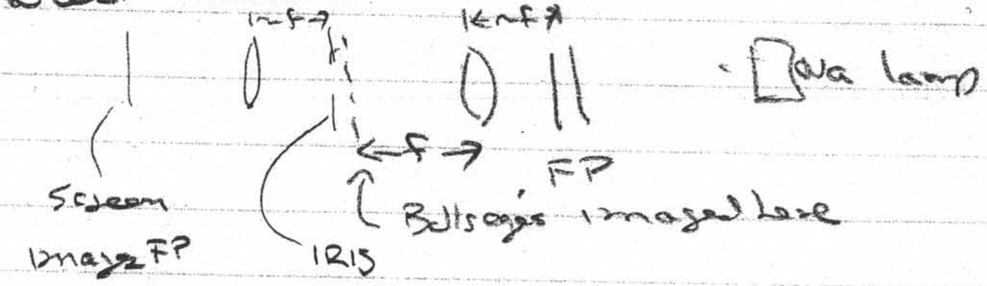
CHANGED !!



measure r's to get θ's

θ's are angles of max transmission or min reflection

C. Relationship between Bullseye fringes ($d - s$) and Fizeau fringes (localized between plates.



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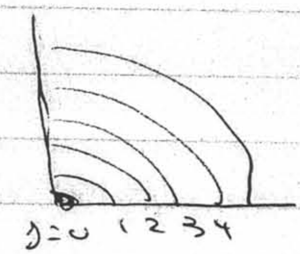

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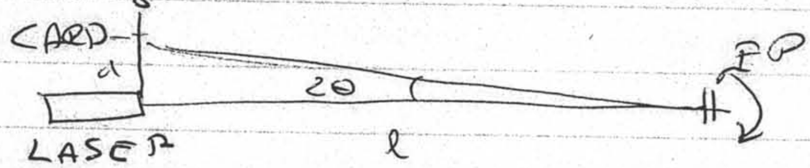

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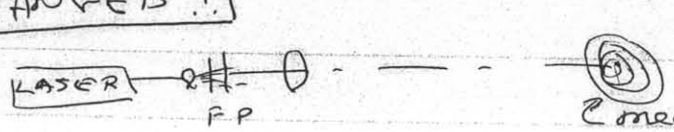

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