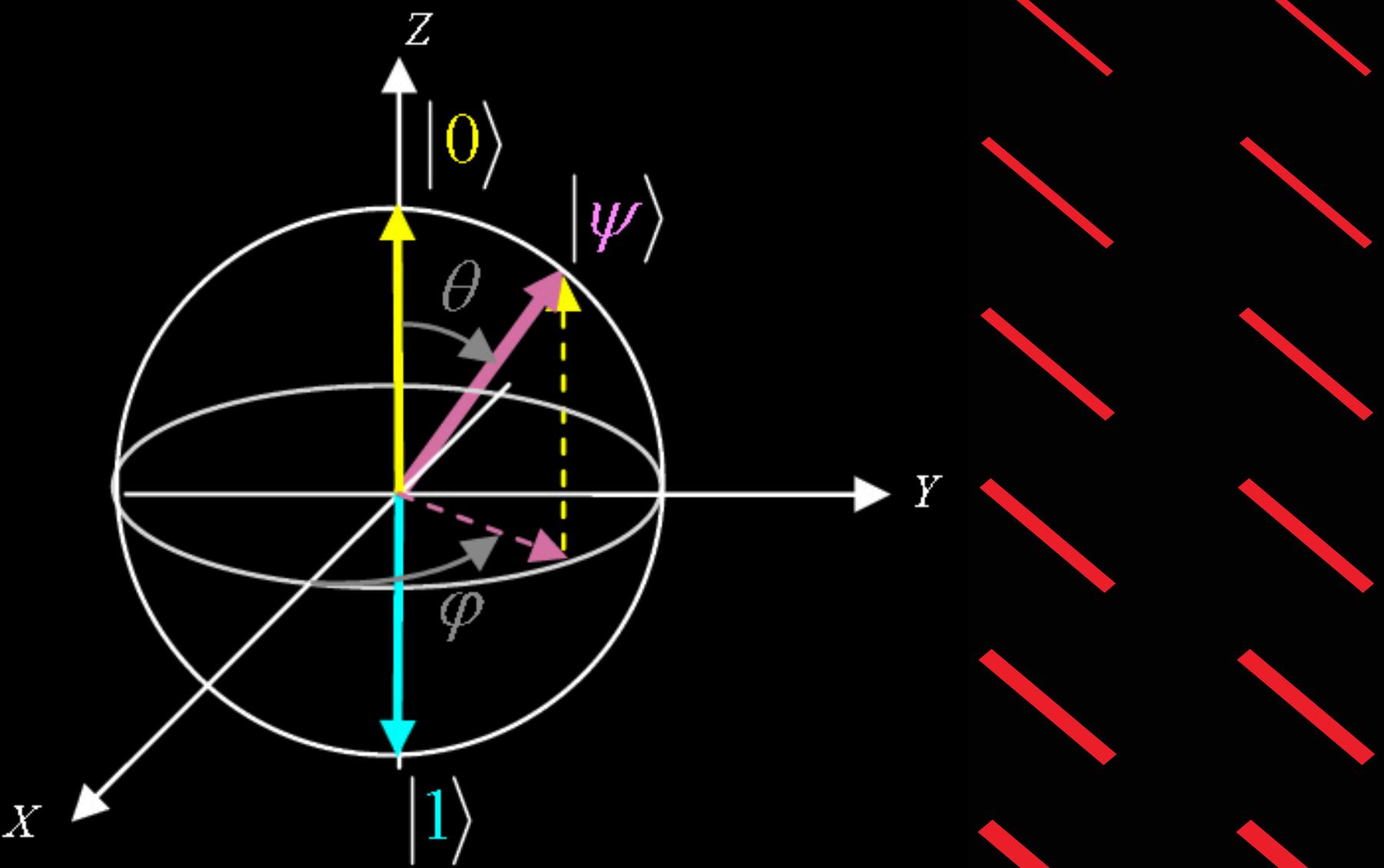
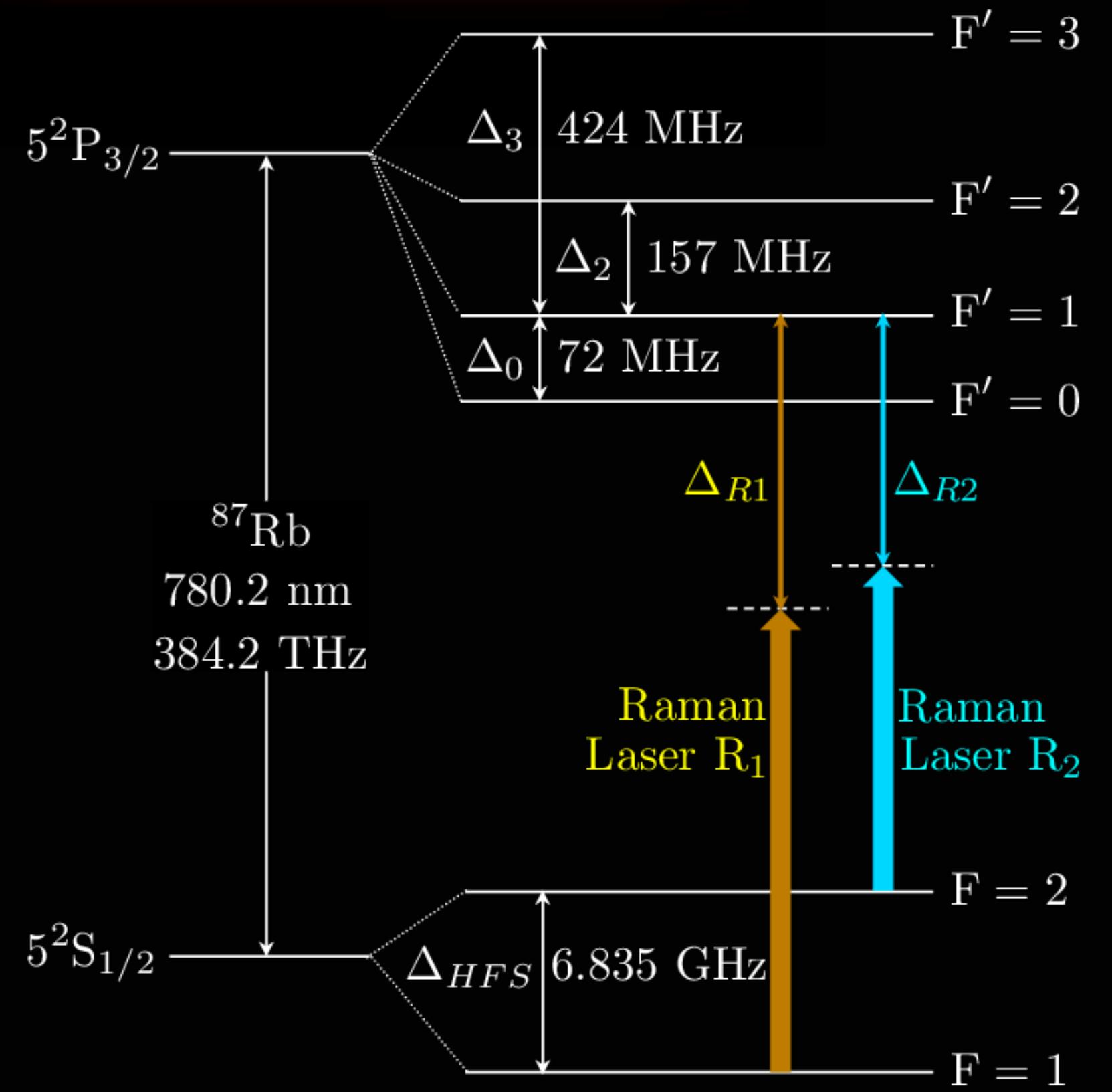


Raman Laser system

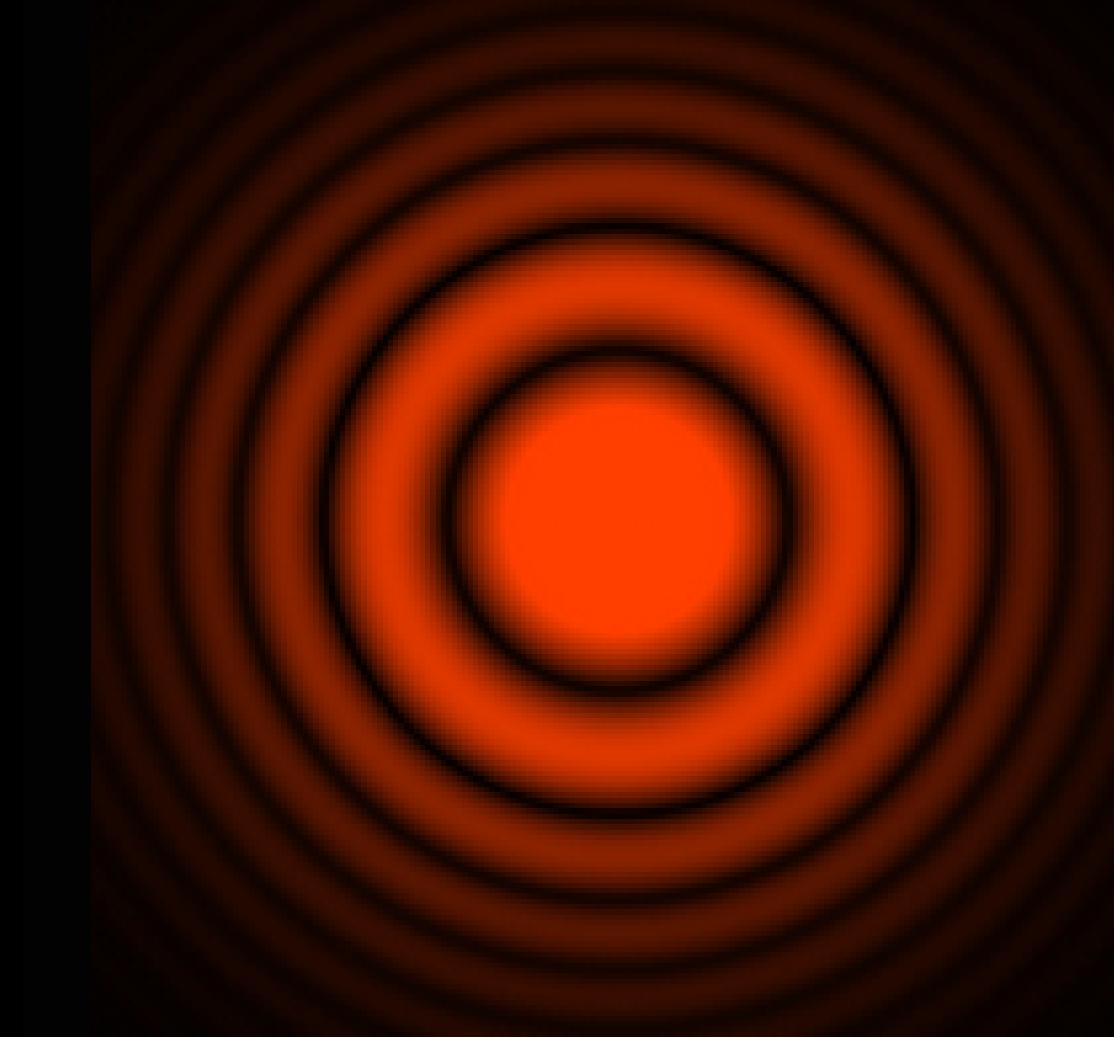
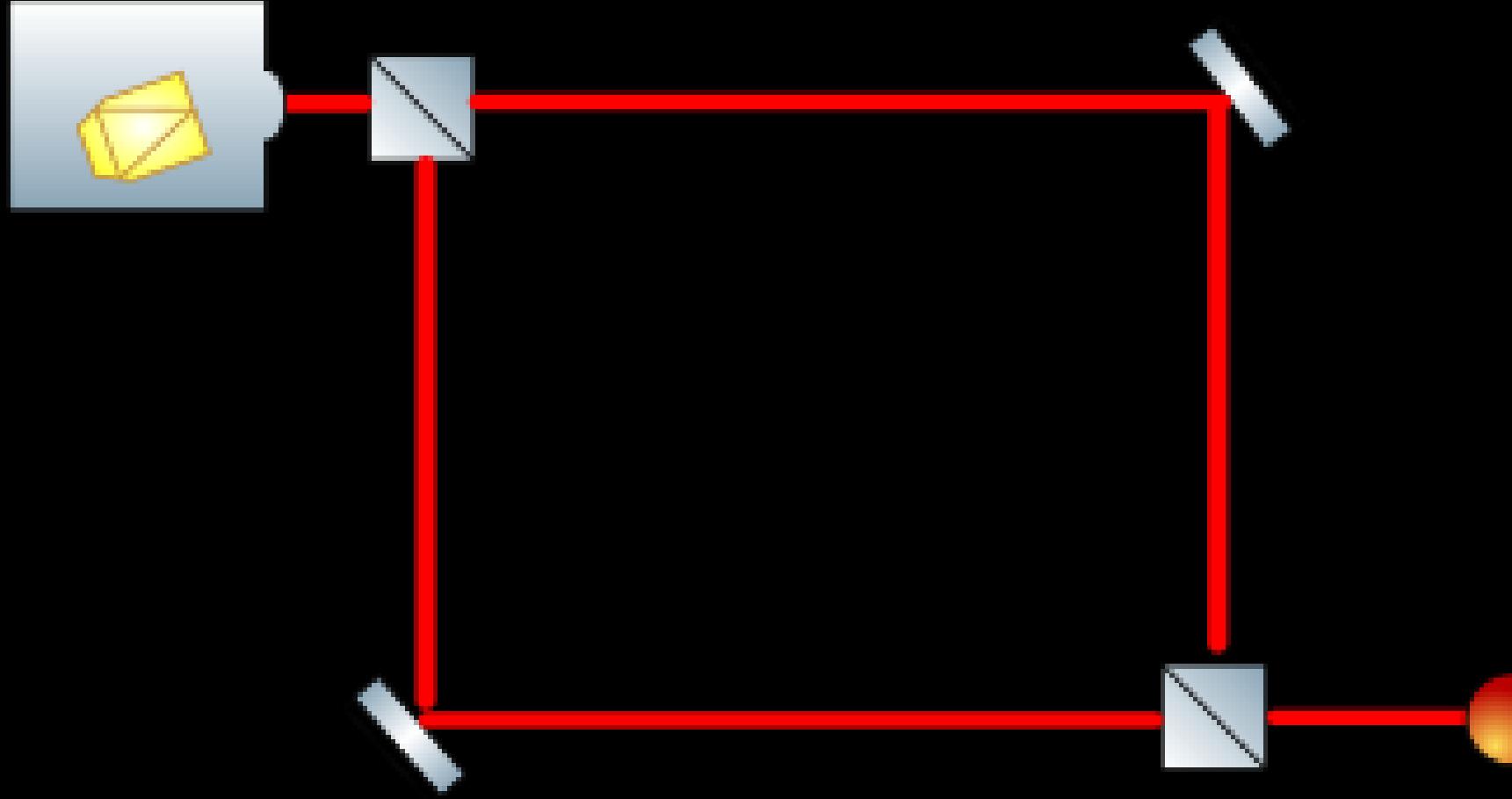
Amplifying and locking the Raman laser beams for
gravimeter atom interferometry



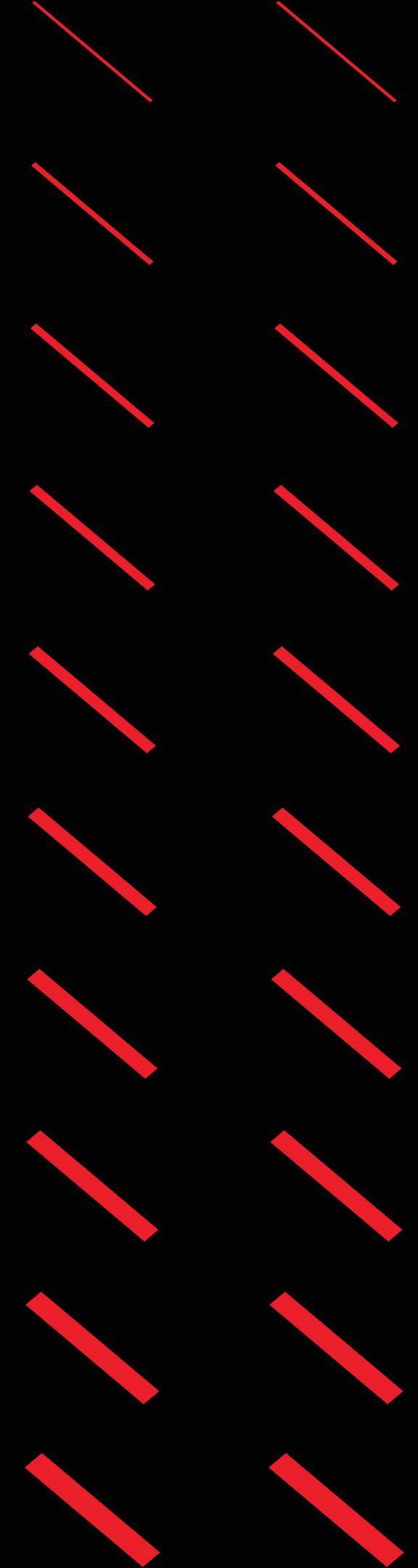
1-Raman lasers



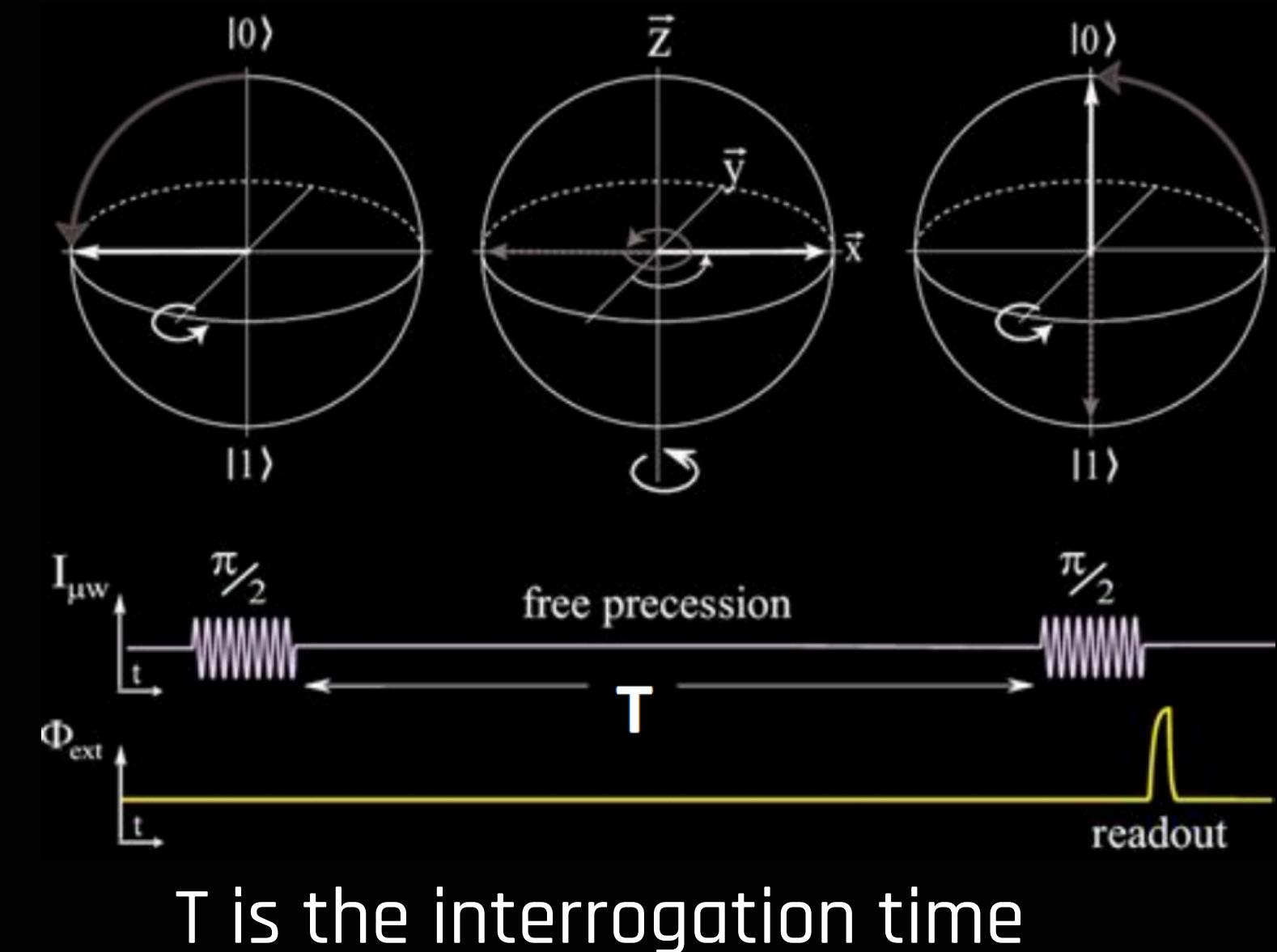
2-Mach Zehnder Interferometry



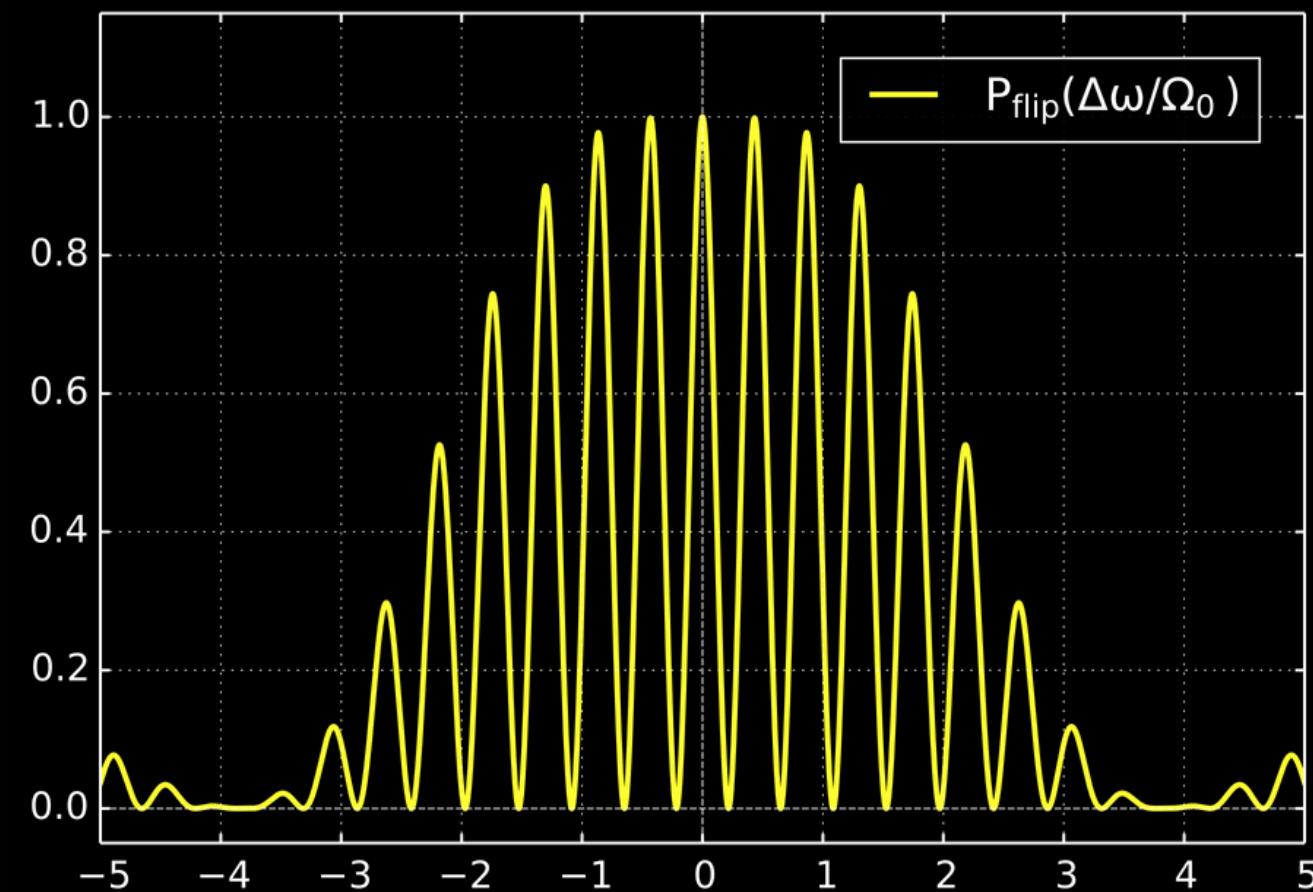
$$I(\Delta\varphi) = I_{\max} \cos^2(\Delta\varphi/2)$$



3-The Ramsey Interferometry



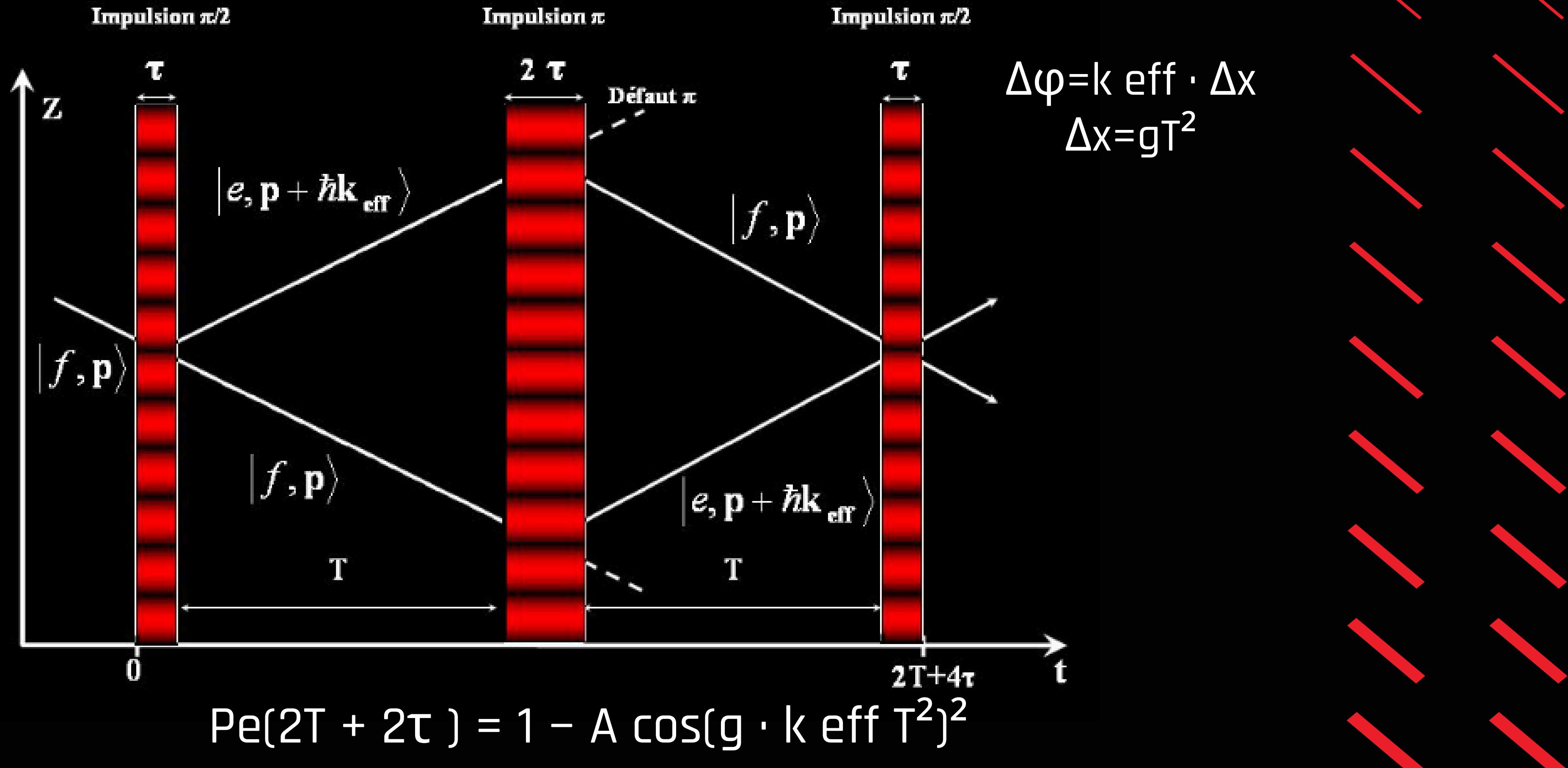
T is the interrogation time



$\Delta = \omega - \omega_0$ is the detuning

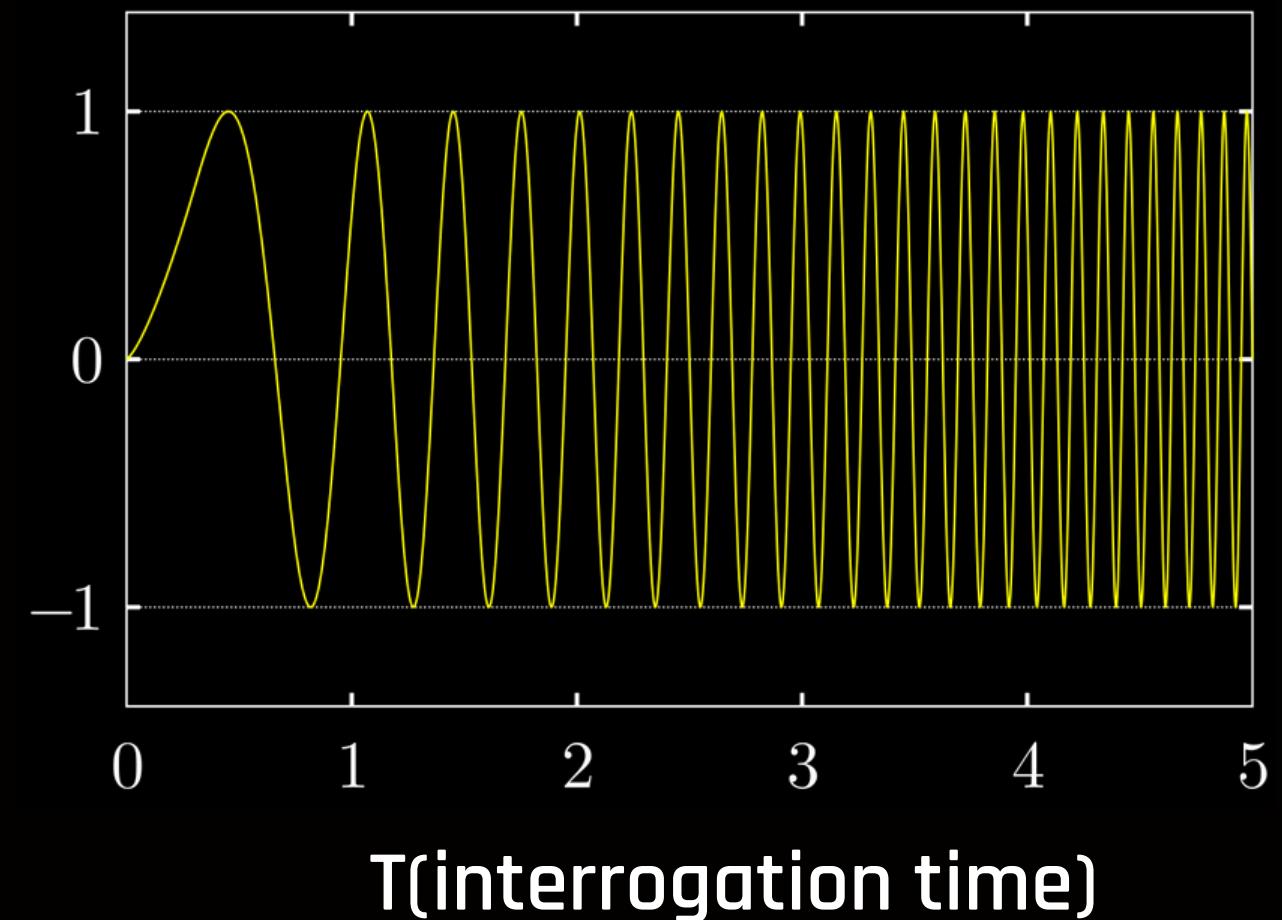
$$P_1(T, \Delta) = \cos^2(\Delta * T / 2)$$

4-Atom Interferometry For gravimetry



5-Getting a value For g

Chirp



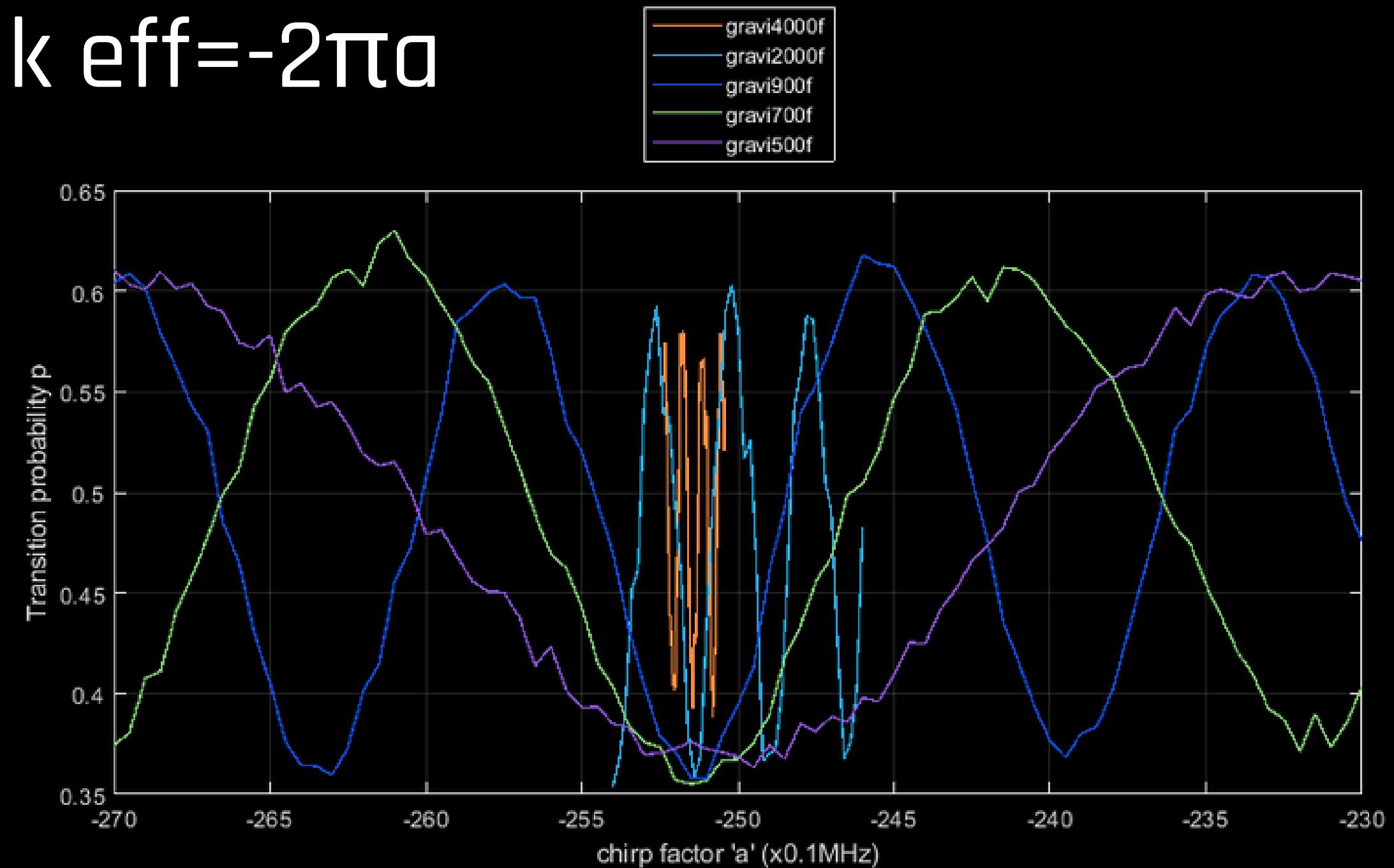
$$Pe(2T + 2\tau) = 1 - A \cos(g \cdot k_{\text{eff}} T^2 + (2\pi a \cdot T) \cdot T)^2$$

a is the chirp rate

it's equivalent to changing the
detuning Δ with time in the Ramsey
interferometer.

θ -Gravimetry results

$g \cdot k_{eff} = -2\pi a$



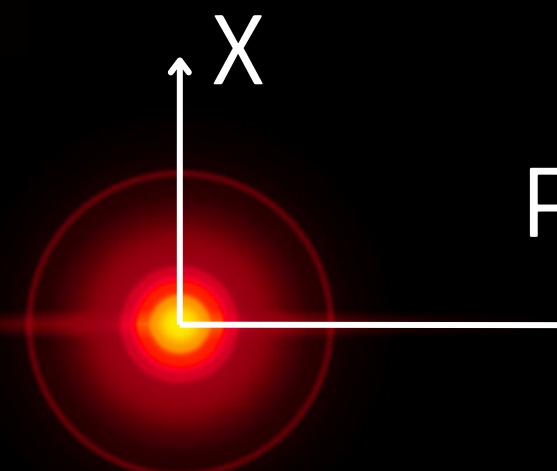
$$g = -2\pi a/k_{eff} = -2\pi \frac{-25.145 \frac{\text{MHz}}{\text{s}}}{2 \frac{2\pi}{780\text{nm}}} = 9.80655 \frac{\text{m}}{\text{s}^2}$$

7-Squeezing

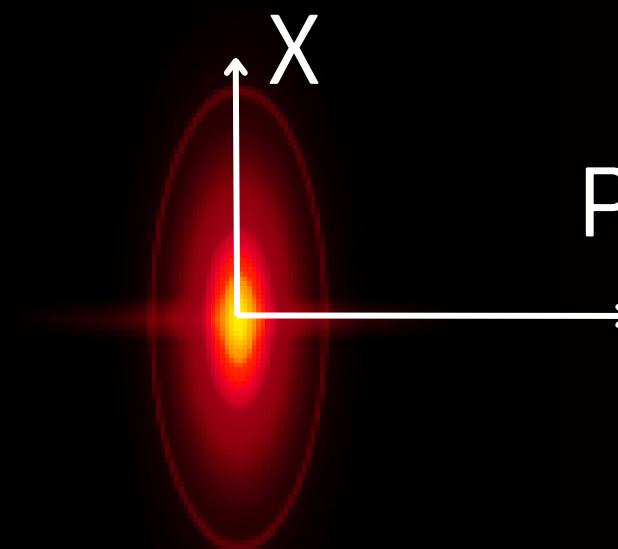
Uncertainty Principle

$$\Delta X \Delta P \geq \hbar/2$$

Coherent state

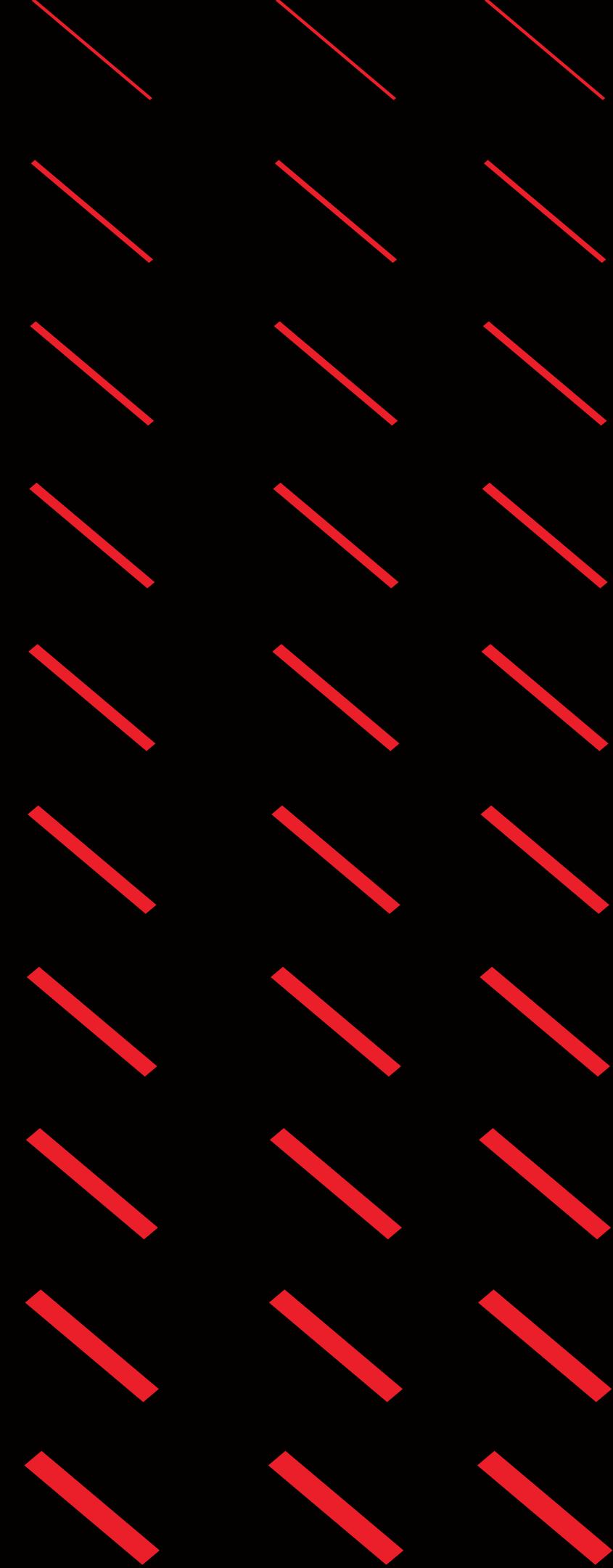
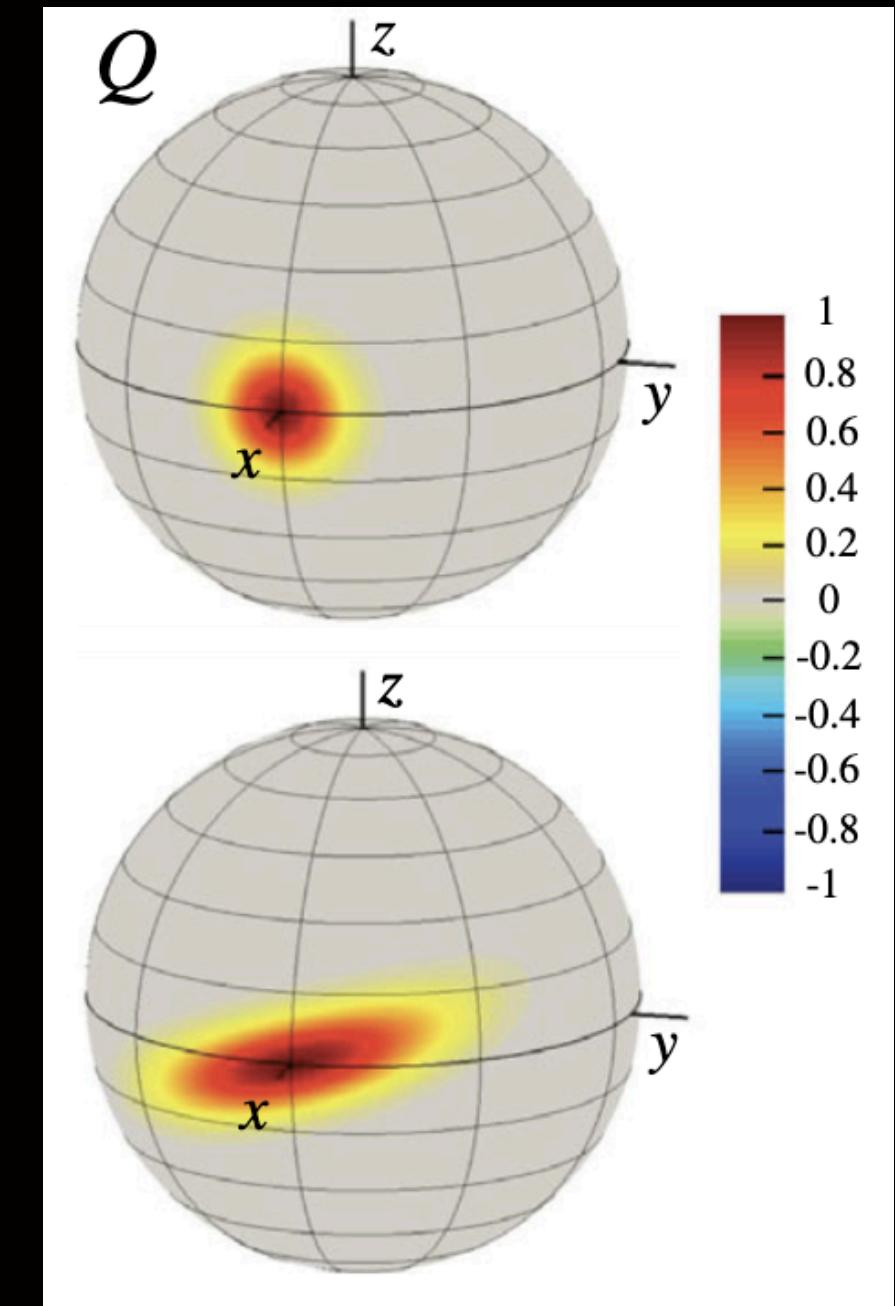


Squeezed state

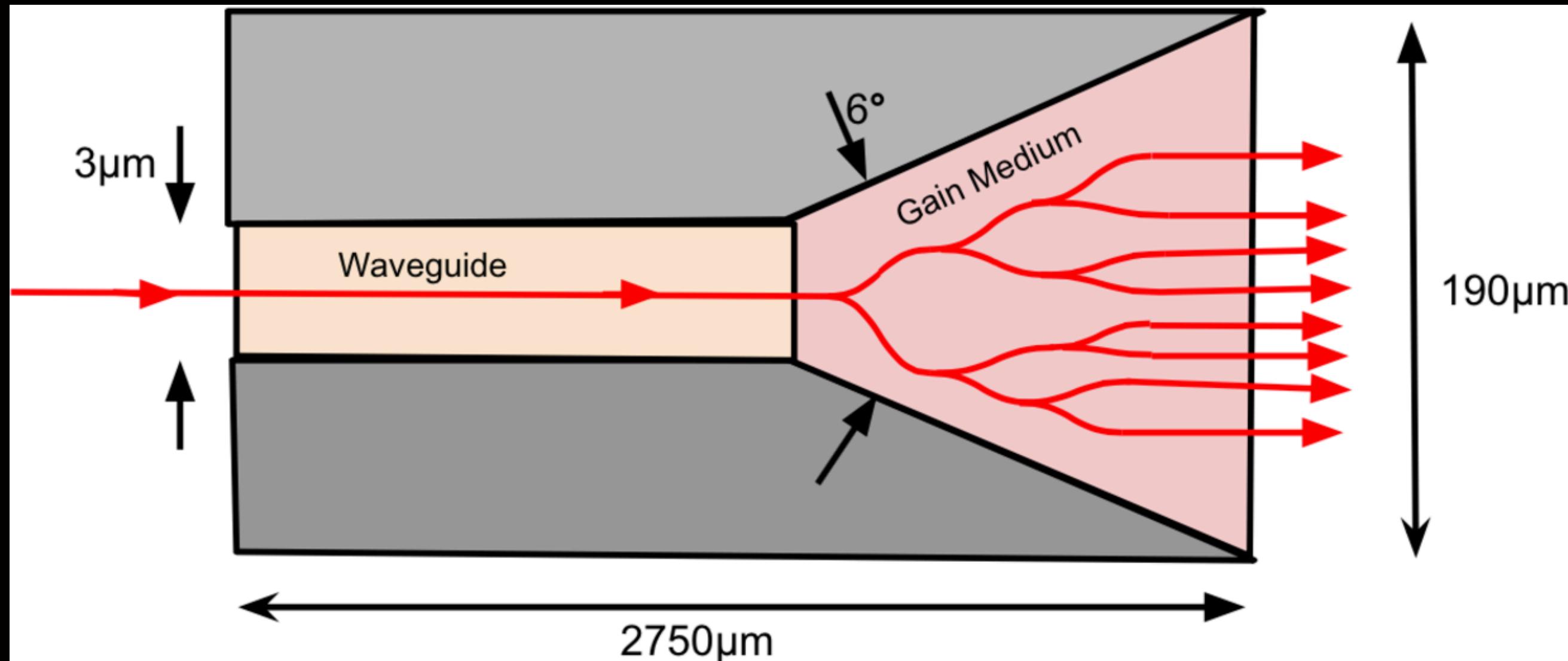


$$\Delta X = \Delta P = \sqrt{(\hbar/2)}$$

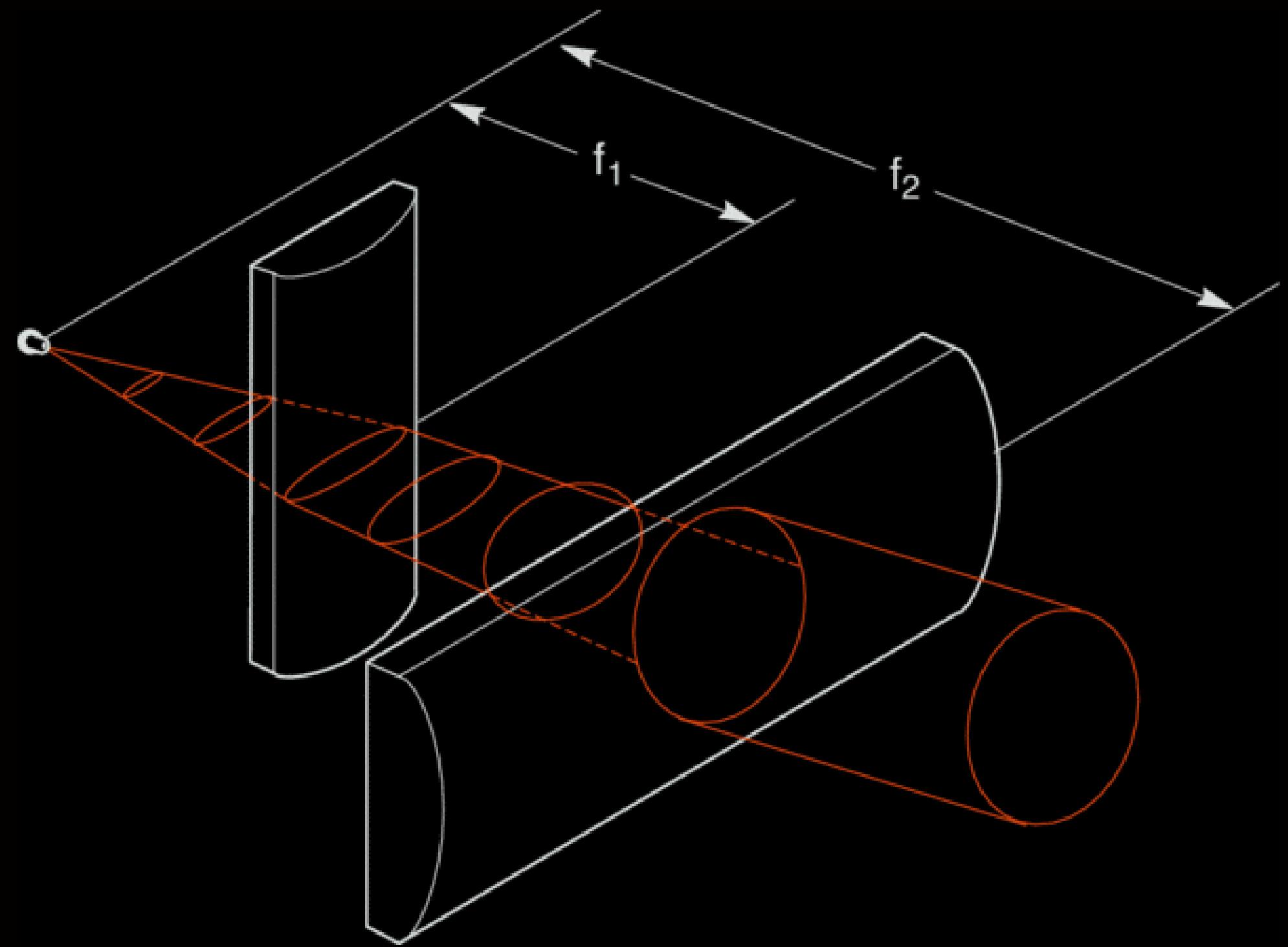
$$\Delta X > \Delta P$$



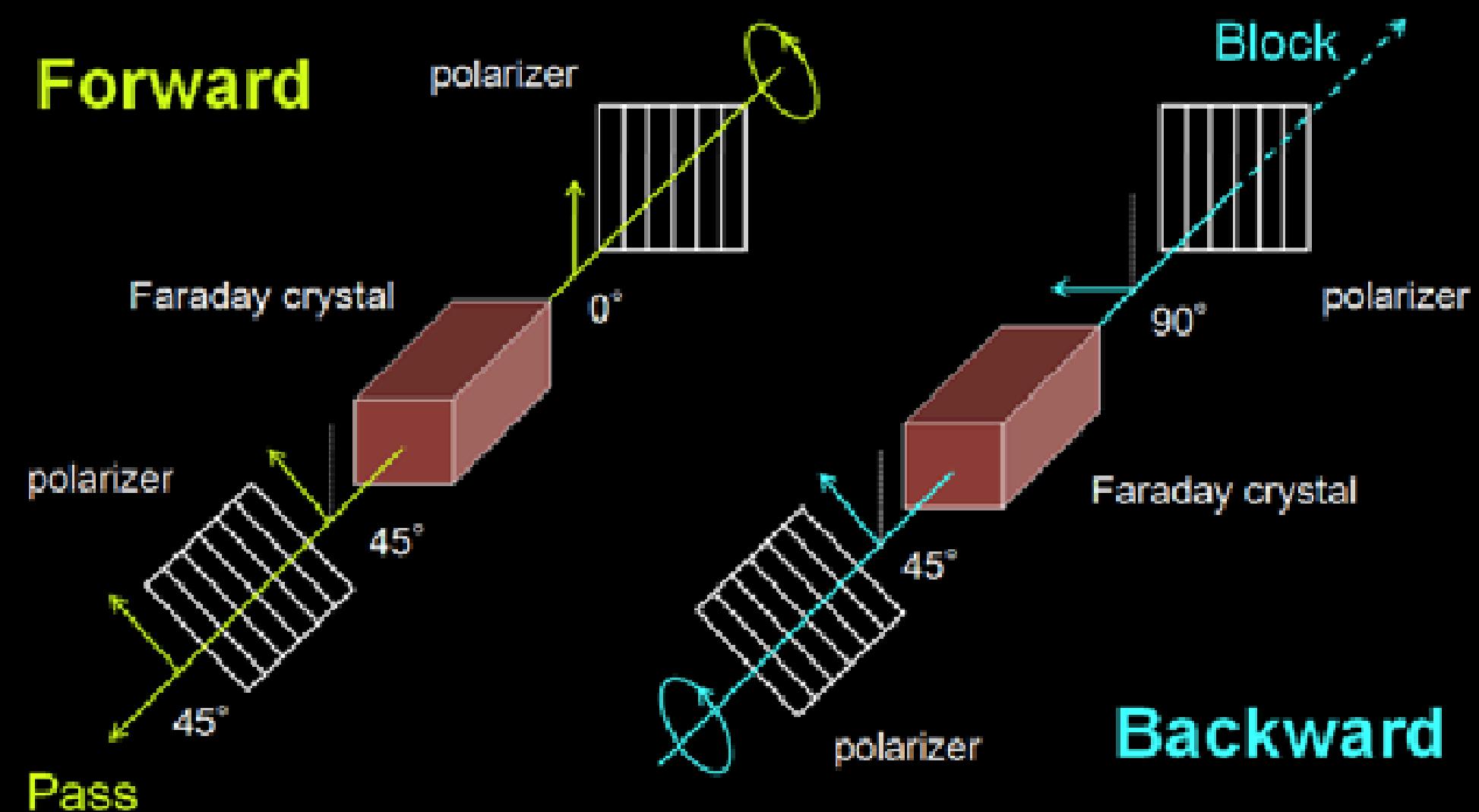
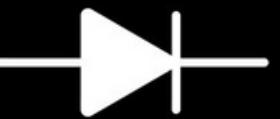
8-The Tapered amplifier



θ -Astigmatic output of TR

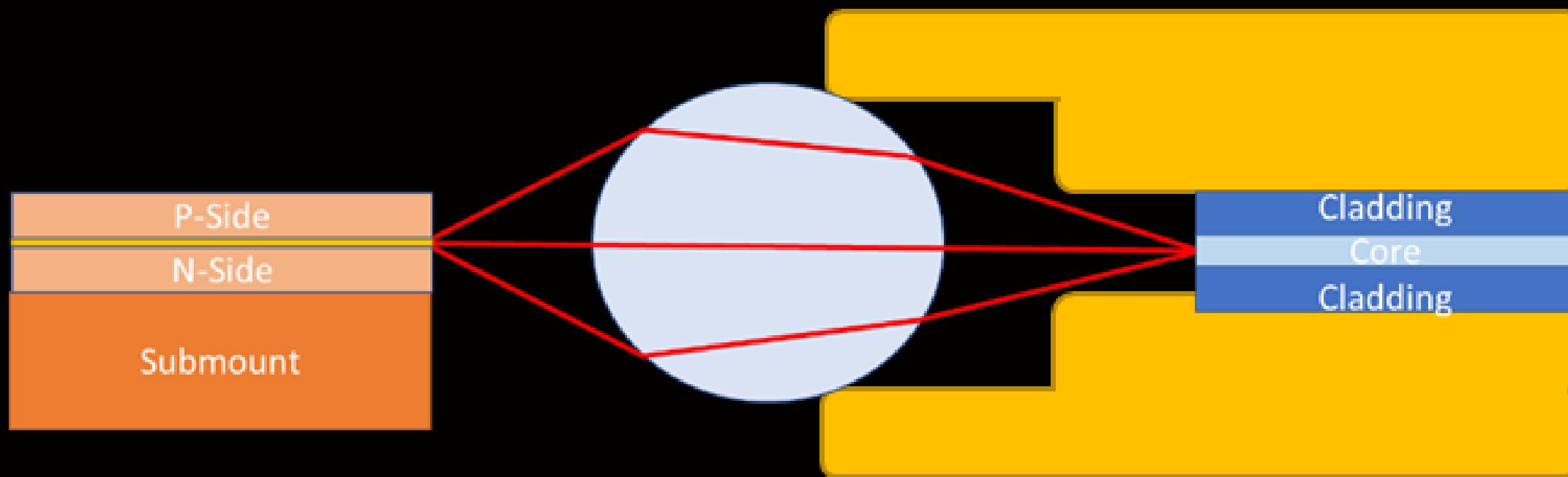
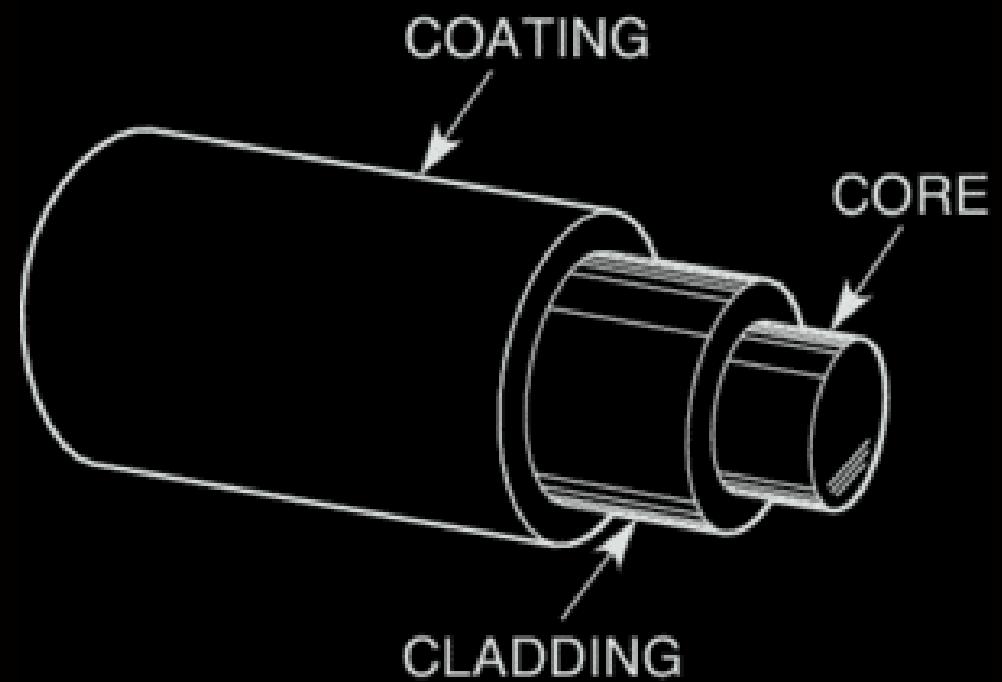


10-The optical isolator

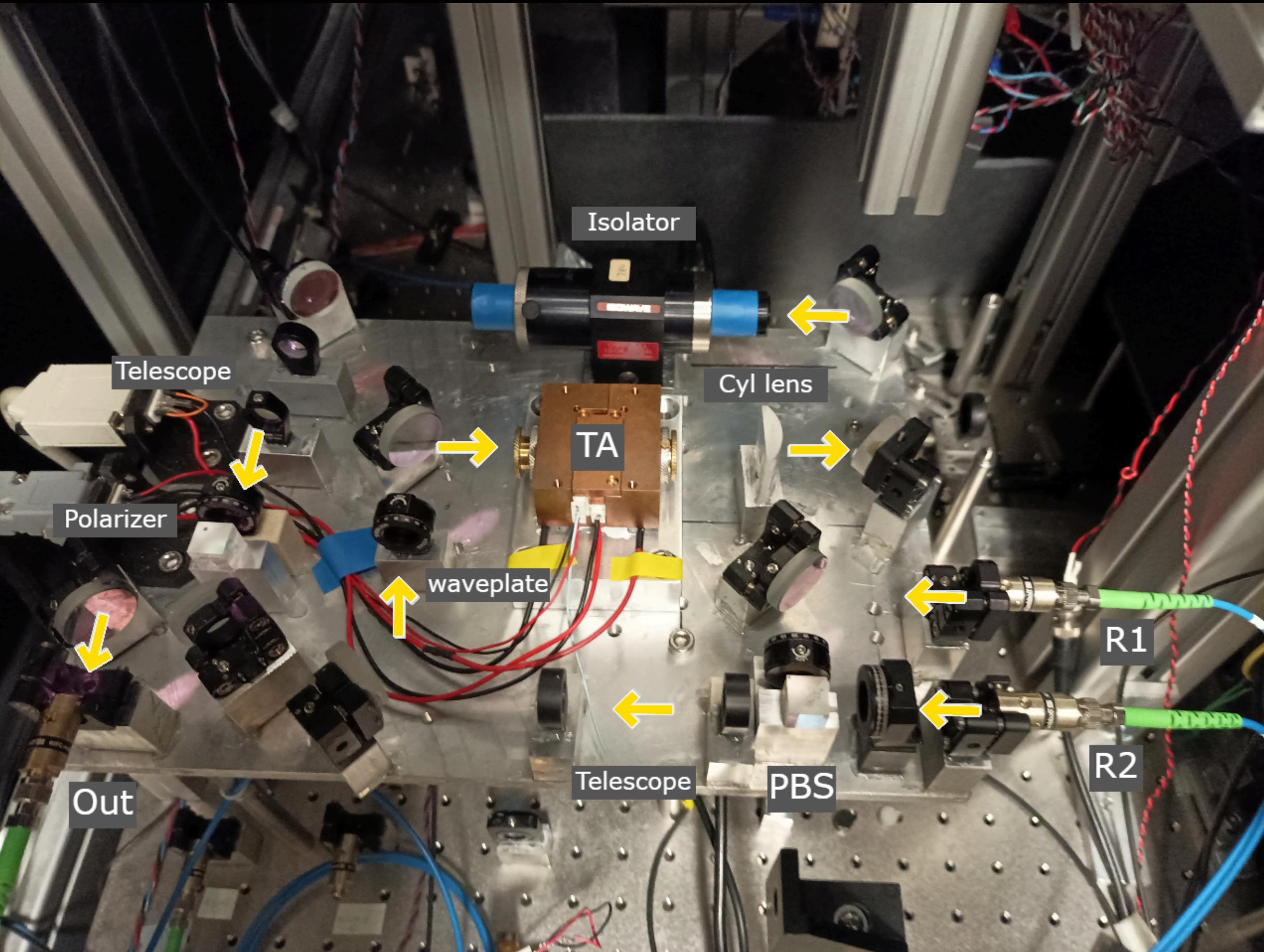


11-Fiber coupling

OPTICAL FIBER

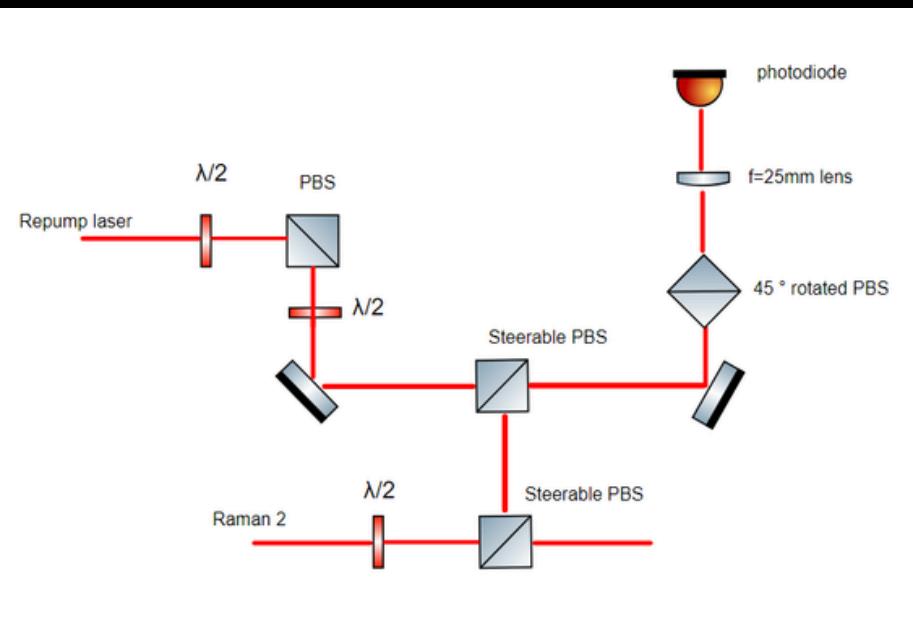


12-The TA's build

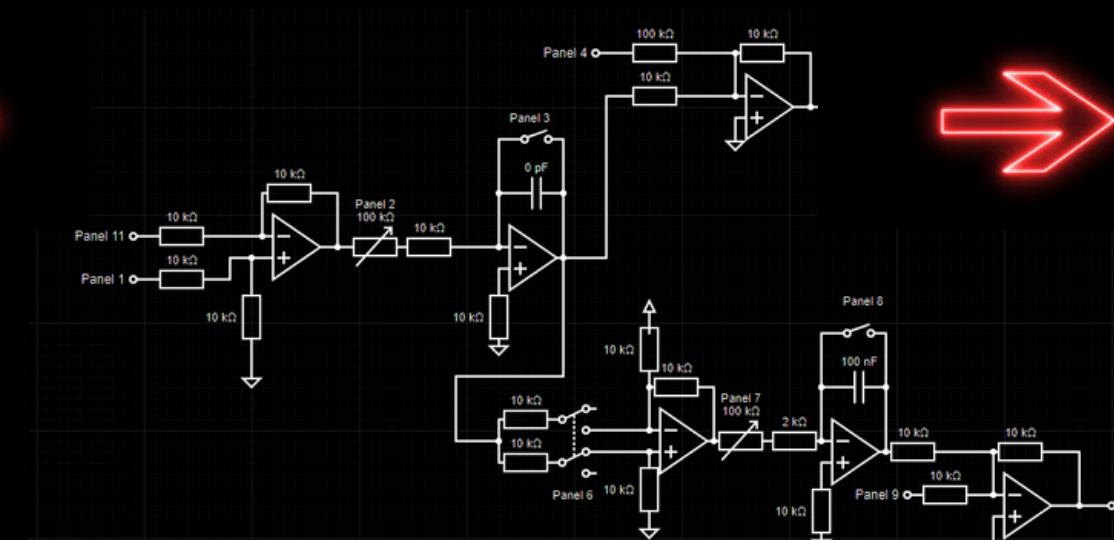


13-The offset lock

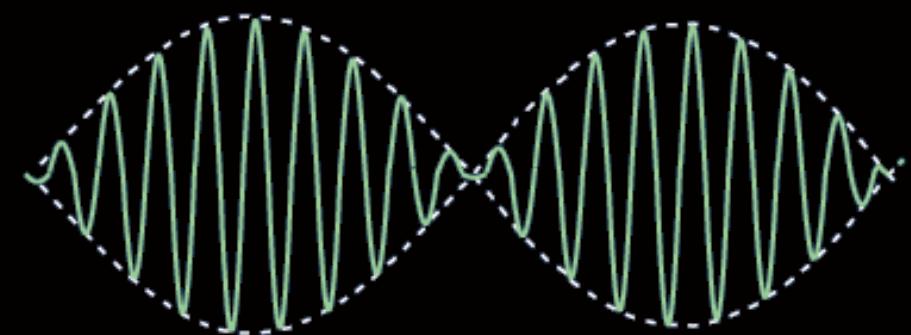
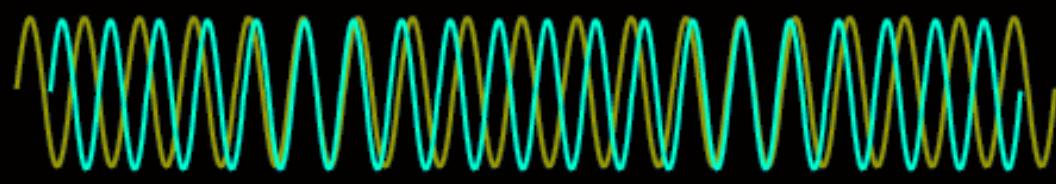
Integrator
+ double
integrator



F to U



R2 laser
current
and piezo

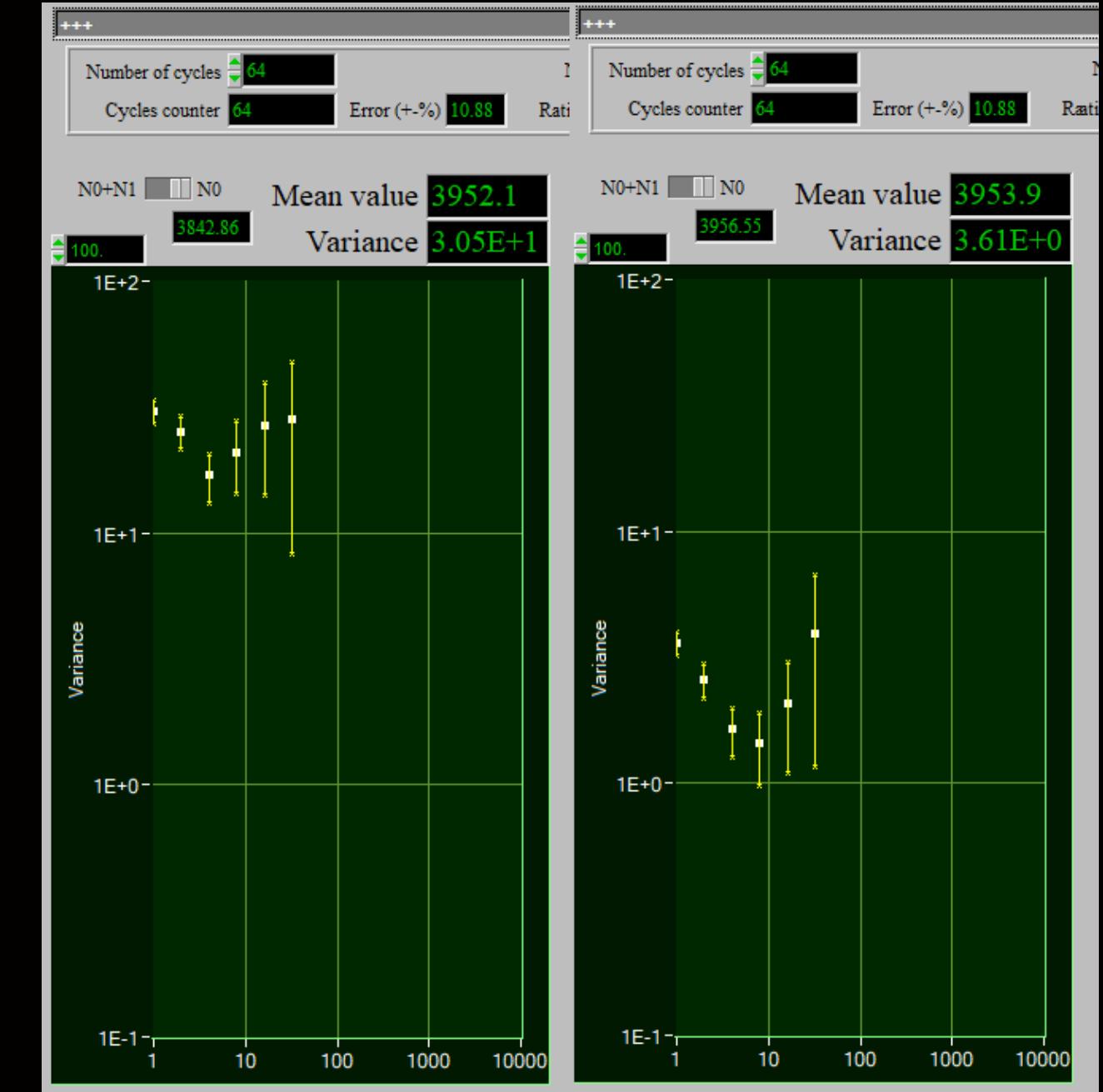
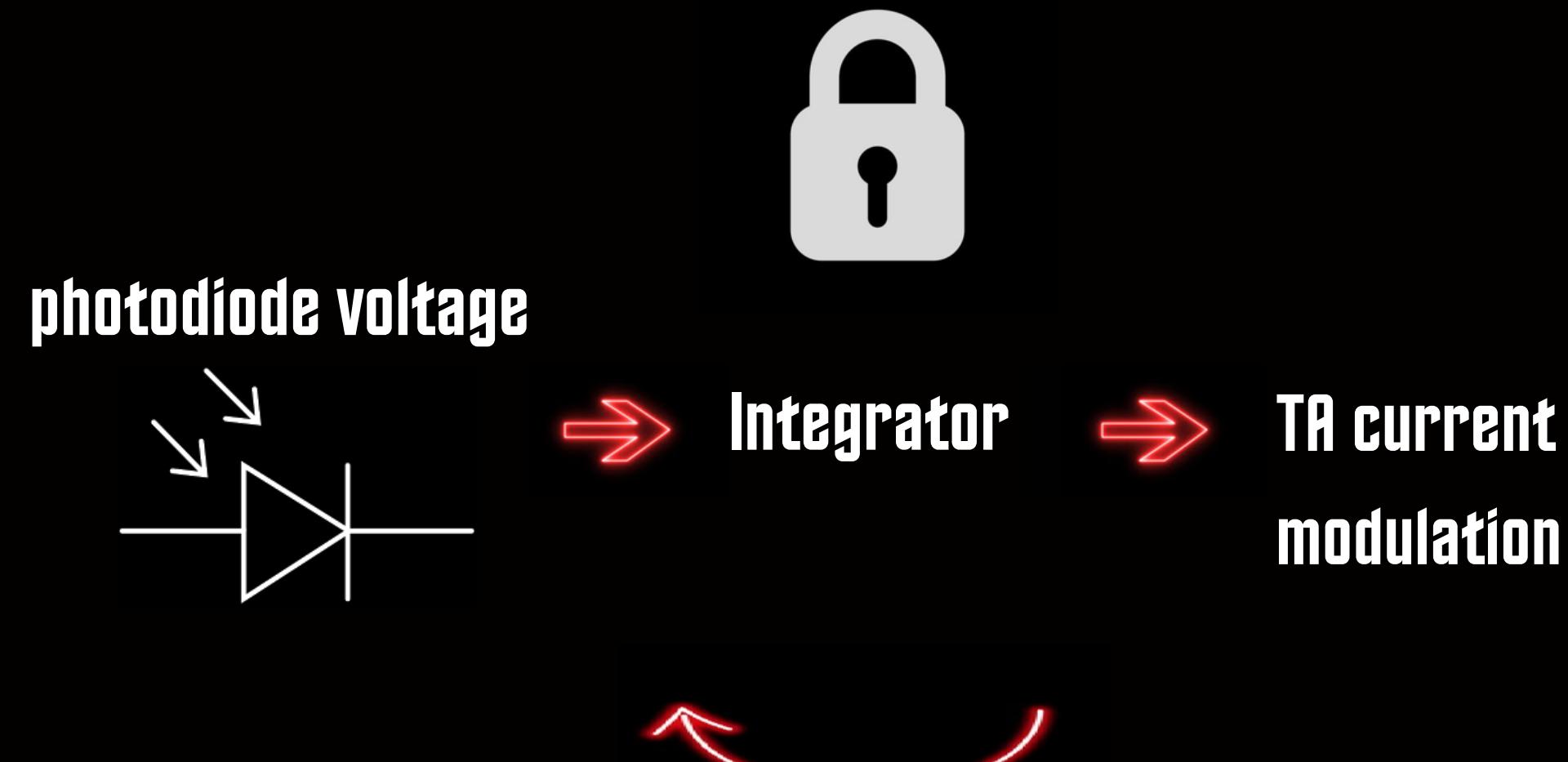


Repump laser



Raman 2

14-Raman laser power lock



Thank you for your attention!

