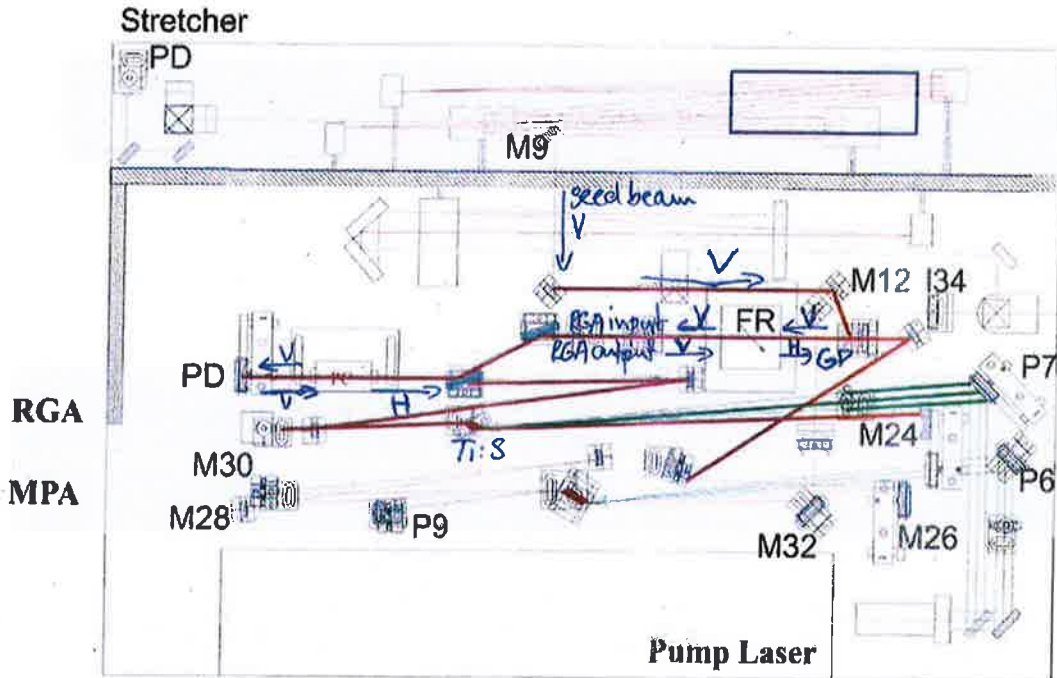


Q13



a)

From the stretcher output path, the beam height is changed from 5.5" to 2" and kept at this level.

The polarization of the seed beam is V. The beam gets reflected by a Glan cubic polarizer into a Faraday rotator (FR). The function of the FR is to separate the output of RGA from the input of RGA by 90°. FR has no effect on the input beam. Output of RGA is vertically polarized and FR rotates it to horizontal \Rightarrow RGA output passes GP into multi-pass amplifier (MPA).

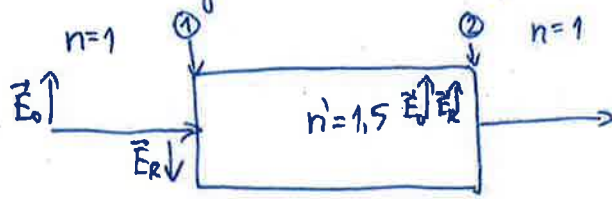
After hitting the photo diode (PD), the Pockel's cell* (PC) rotates RGA input from V to H. The RGA input enters the RGA cavity and does 10-12 oscillations in H-polarisation. The beam gets amplified in Ti:Sapphire crystal (Ti:S) by the pump (green). When strong enough, the PC rotates RGA amplified input from H to V so it can leave the cavity.

Cavity: PD \leftrightarrow M24 oscillation in H polarisation

* Pockel's cell needs to be under high voltage to perform the rotation of polarization at a very precise time.

Q.14 a) We first find damage at the back side of the crystal (Boxd 12.1.1.)

Assuming normal incidence for calculations at refr. indices of 1 (air) and 1,5 (crystal)



at ① : destructive interference } bigger damage at the back side
 ② : constructive interference

$$\frac{E_R}{E_0} = \frac{n-n'}{n+n'}$$

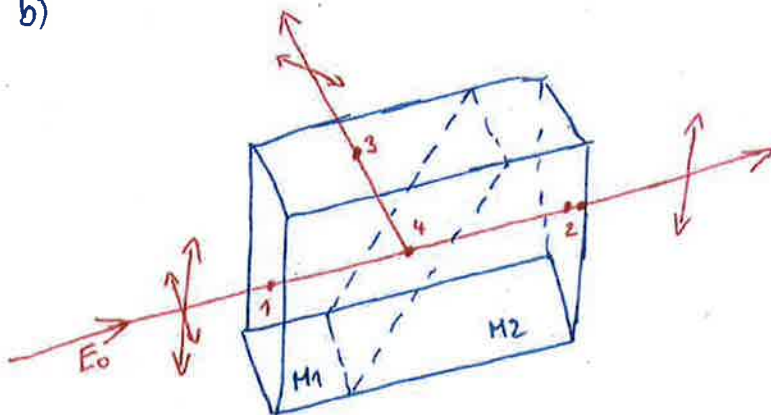
here n = current medium (where beam is)
 n' = next medium (where it enters)

$$\textcircled{1} \quad \frac{E_R}{E_0} = \frac{1-1.5}{1+1.5} = \frac{-0.5}{2.5} = -0.2 \Rightarrow \underline{E_{Tot} = 0.8E_0}$$

$$\textcircled{2} \quad \frac{E_R}{E_0} = \frac{1.5-1}{1.5+1} = \frac{0.5}{2.5} = 0.2 \Rightarrow \underline{E_{Tot} = 1.2E_0} \quad / \cdot 0.8 \text{ because only } 0.8 \text{ is transmitted}$$

$$= \underline{0.96}$$

b)



1 - Full E_0 , destructive interference

2,3 - $1/2E_0$, constructive interference

4 - constructive destructive depends on material positions (M_1 vs M_2)
 also depends whether M_1 & M_2 are separated with an air gap or glued

So the answer is "it depends" - with air gap, at ④
 with glue, ?