

Example lab-book entry

Comments
in gray

24/9/2020

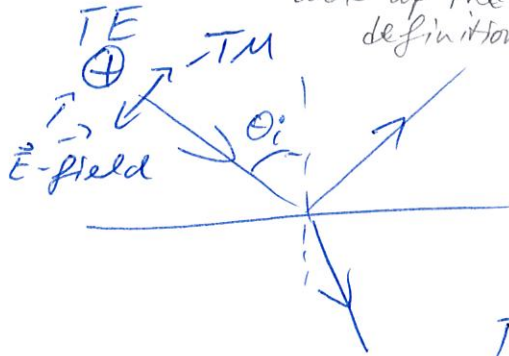
Brewster angle, Fresnel formulas

and minimum deviation by a prism

preparation ← Don't forget to prepare. Makes you much faster!

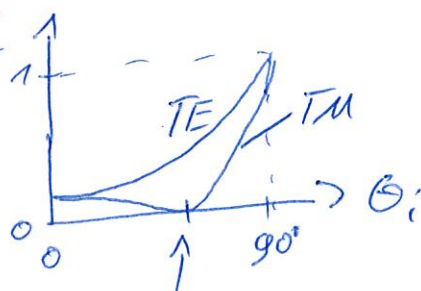
↑
Don't forget the year, lab-books have a long life-time

- The keywords of the description ← look up the definitions and summarize them.
- TM polarization:
- angle of incidence θ_i :



- Brewster angle:

$$R_{TM}(\theta_B) = 0$$



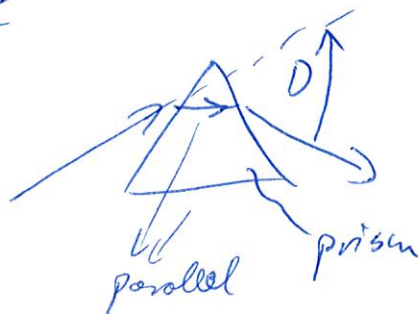
Brewster angle θ_B

TM = "P"
TE = "S"

connect with prior knowledge if different notations are used

- Minimum deviation after crossing a prism.

The deviation angle D is minimal when the situation is symmetric

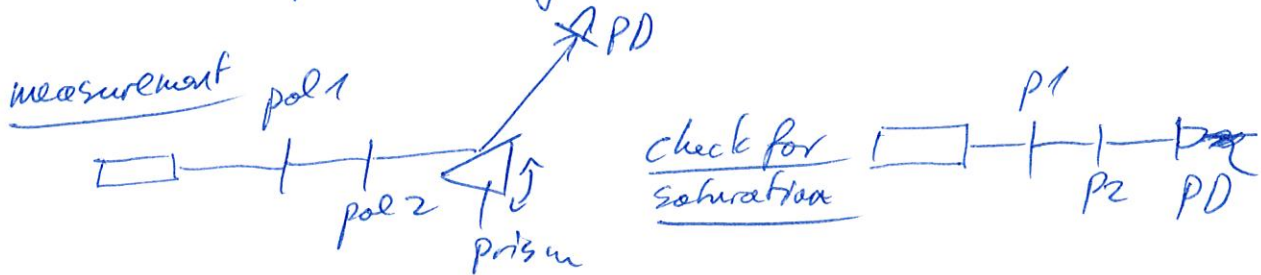


put page numbers for the table of contents at the beginning of the lab book

- Ideas for the measurement $\leftarrow$ imagine some variations of the setups

First measure the Brewster angle, as it only occurs in TM polarization. $\Rightarrow$ Thereafter we are ~~sure~~ sure that we have TM polar.

Use the two polarizers to attenuate the beam to avoid separation of the photodiode.



- Reference values $\leftarrow$ Handy to have, so you can check your preliminary results
For $n = 1,5 \Rightarrow \Theta_B = 56,3^\circ$

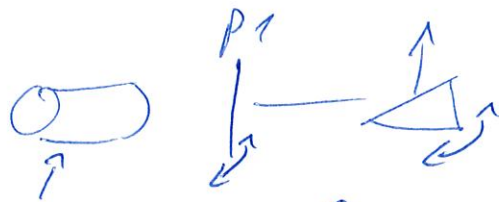
measurement

- Brewster angle:

We went close to $56^\circ = \Theta_i$ and checked the intensity of the reflected red spot on the wall when rotating the laser around its axis

$\Rightarrow$ Minimum observed but the red spot never disappeared.

Setup 2: add a polarizer



best position from Setup 1

We minimized the intensity of the reflected light by optimizing the polarizer angle and the angle of incidence.

$\Rightarrow$ reading for θ_B : ~~$142^\circ 25'$~~ $\pm 5'$
 $144^\circ 25'$ (or $10'?$)

touching the pins misaligns!

The reading for $\theta_i = 0$ (reflected light goes back to the Laser): ~~$87^\circ 0'$~~ $\pm 5-10'$
 $88^\circ 15'$

• $R(\theta_i)$

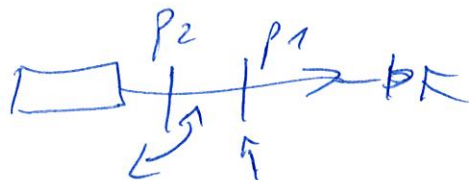
Setup 1:



needs to be switched on

12.3V (Saturated)

Setup 2:



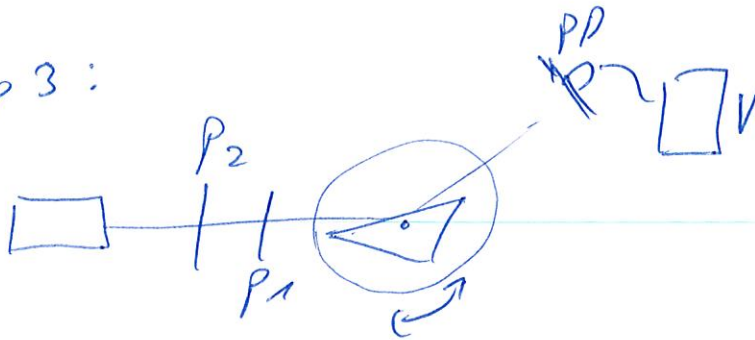
adjusted P_2 to 10.04V

do not touch
if not TM polar B lost

After blocking the light with our hands
~~PP~~ between the laser and P2 we read 0,12V
 due to the background light in the room.

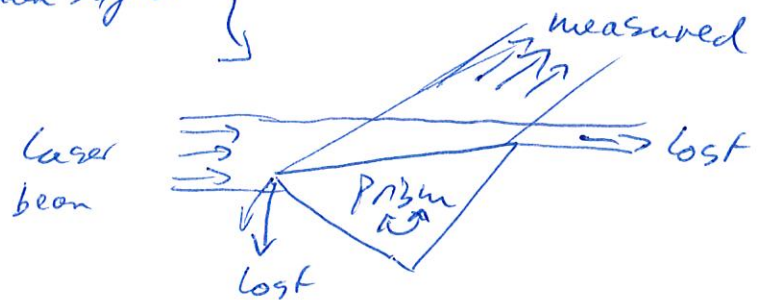
$\Rightarrow$ Mark with and without laser for all angles θ_i

Setup 3:



positioning of the prism on the rotation stage
 is difficult to access large θ_i

We succeeded to get $\theta_{i,max} = 87,4^\circ$
 without losing ~~to much~~^{any} light



Angle reading °	Voltage with laser	Voltage without laser	
172,25	8,28	0,11	$\theta_{i,max} = 87,1^\circ$
167,258	3,9	0,08	
162,25	1,88	0,12	
157,25	0,57	0,15	
152,25	0,32	0,16	
147,25	0	0	$\theta_i = 0^\circ$ at $85^\circ 0' \pm 5'$
142,25	0	0	
137,25	0	0	
132,25	0,14	0	
127,25	0,21	0	
122,25	0,37	0	$\theta_{i,min} = 17,4^\circ$
117,25	0,35	0	
112,25	0,38	0,01	
107,25	0,45	0	
102,25	0,48	0	
↑	↑	↑	
<u>$\pm 5'$</u>	<u>$\pm 0,01V$</u>	<u>$\pm 0,01V$</u>	