

Phase retardation, $\phi = \frac{2\pi}{\lambda} (n_e - n_o) d$

If $\phi = \frac{\pi}{2}$

Quarter Wave Plate

$$\left(\hat{a}_x E_x + \hat{a}_y E_y e^{j\phi} \right)$$

$$\hat{a}_x E_x + \hat{a}_y E_y e^{j\pi/2}$$

If $E_x = E_y$, $\phi = \frac{\pi}{2} \Rightarrow$
 $\theta = 45^\circ$

Input
 $\phi = 0 \Rightarrow$ Linear

Left
 Circular Polarization

If $\phi = \pi$

Half wave plate

$$\hat{a}_x E_x + \hat{a}_y \hat{E}_y e^{j\pi}$$

$$= \hat{a}_x E_x - \hat{a}_y E_y$$

Polarization

Rotator

Marks & Attendance - Excel

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Cut Copy Paste Format Painter Clipboard

Arial 10 Font Wrap Text Merge & Center Alignment Number

General Number

Normal Bad Good Neutral Calculation Check Cell Explanatory... Followed Hyp... Hyperlink Input Styles

Insert Delete Format Cells AutoSum Fill Clear Sort & Filter Find & Select Editing

	C	D	E	F	G	H	I	J	K
1	Name	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Total
20									
21	Average	0.00	0.89	0.83	0.39	0.94	2.67	4.33	10.06
22									
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31									

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Clipboard: Cut, Copy, Format Painter

Font: Arial, 10, Bold, Italic, Underline, Text Color, Background Color

Alignment: Wrap Text, Merge & Center

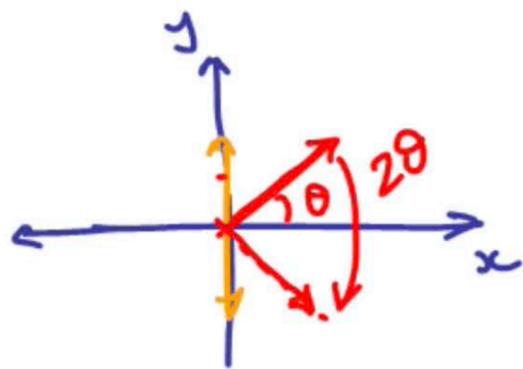
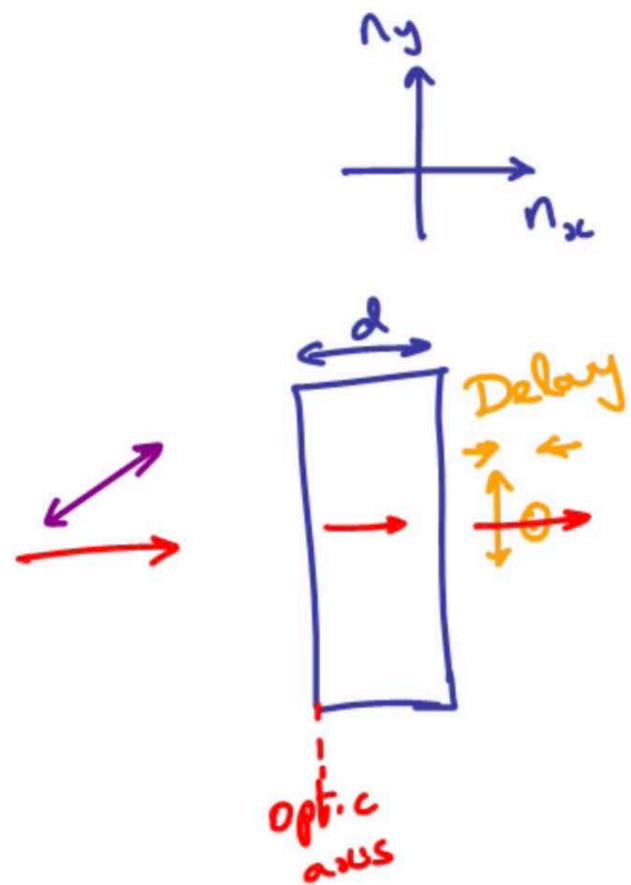
Number: General, Currency, Percentage, Decimals

Styles: Normal, Bad, Good, Neutral, Calculation, Check Cell, Explanatory..., Followed Hyp..., Hyperlink, Input

Cells: Insert, Delete, Format

Editing: AutoSum, Fill, Clear, Sort & Filter, Find & Select

	A	B	C	D	E	F	G	H	I	J	K	L
1	Group No	Roll No	Name	Quiz I	Quiz II	Lab	Tut	Final	Total			
20												
21			Average	4.97	10.06	8.03			23.06			
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$$\hat{a}_x E_x + \hat{a}_y E_y e^{j\pi/2}$$

If $\phi = \frac{\pi}{2}$ \Rightarrow $E_x = E_y$, $\theta = 45^\circ$

Input $\phi = 0 \Rightarrow$ Linear
Left
Circular Polarization

If $\phi = \pi$

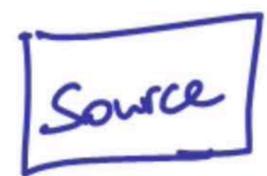
Half wave plate

$$\hat{a}_x E_x + \hat{a}_y \hat{E}_y e^{j\pi}$$

$$= \hat{a}_x E_x - \hat{a}_y E_y$$

Polarization
Rotator

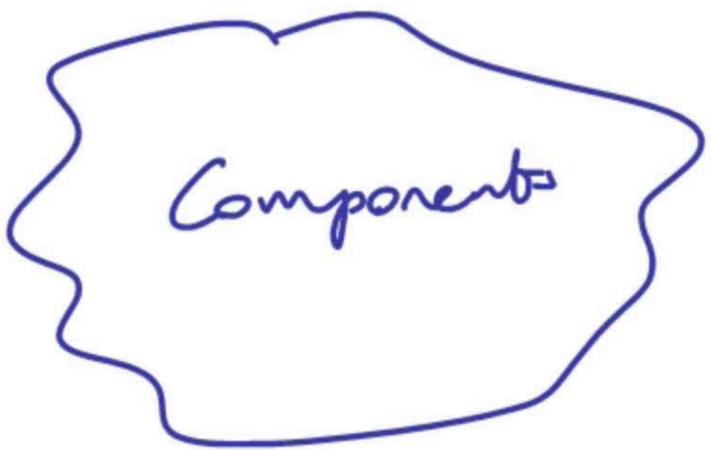
Optical Isolator



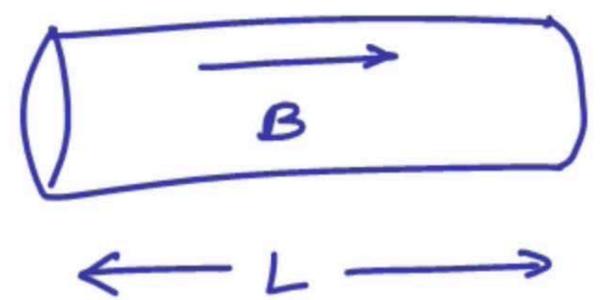
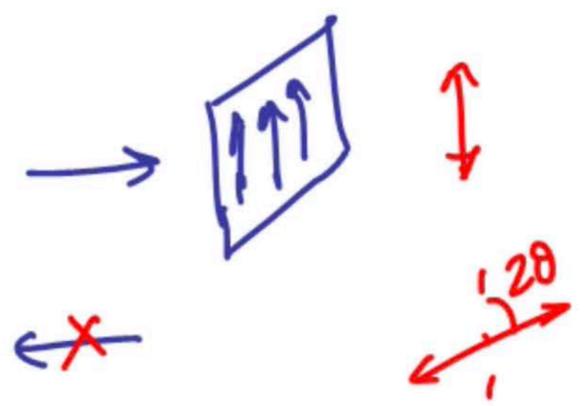
Non-reciprocal response

backreflection leads to

power/spectral instability of laser



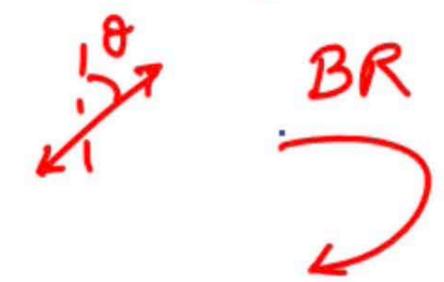
Faraday Effect



Non-reciprocal

$$\vec{D} = \epsilon \vec{E} + j \epsilon_0 \gamma (\vec{B} \times \vec{E})$$

Magneto-gyration coeff.



$\theta = 45^\circ$

$$\theta = -\frac{\pi \gamma}{\lambda_0 n_0} B \cdot L$$

$$\theta = V B L$$

$V \rightarrow$ Verdet const.

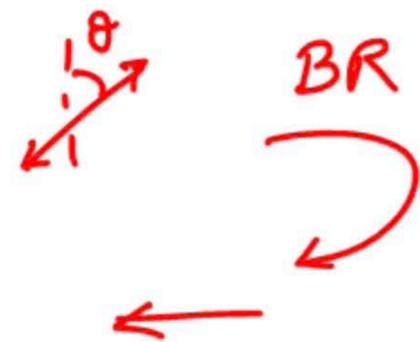
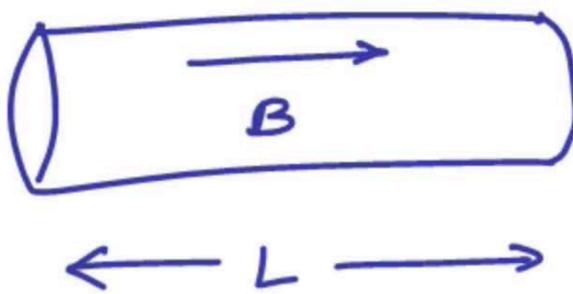
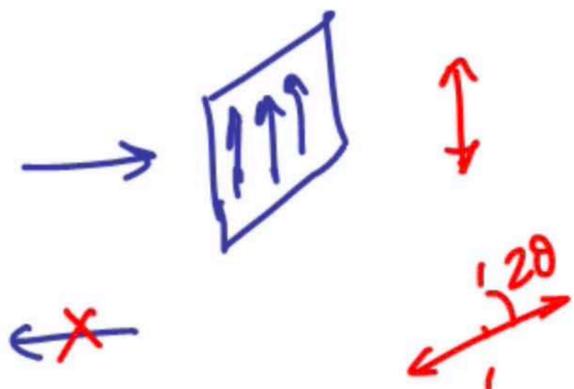
backreflection leads to power/spectral instability of laser

$$\vec{D} = \epsilon \vec{E} + j \epsilon_0 \gamma (\vec{B} \times \vec{E})$$

↳ Magneto-rotation coeff.

Faraday Effect

Polarization-sensitive Isolator



$$\theta = -\frac{\pi \gamma}{\lambda_0 n_0} B \cdot L$$

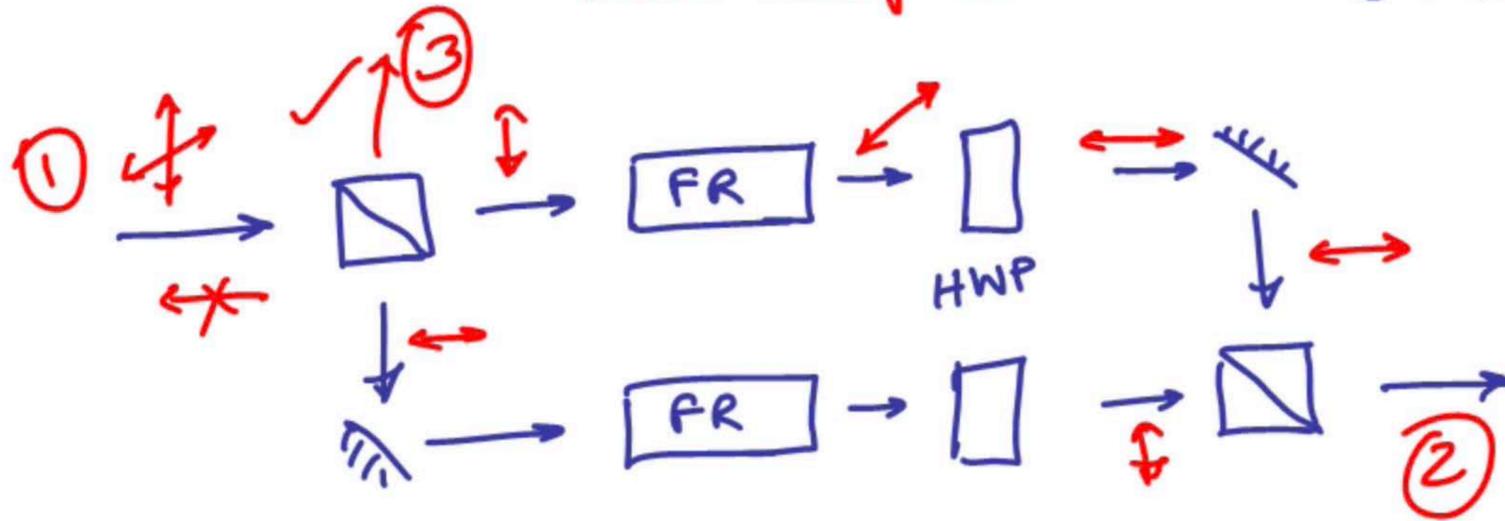
Non-reciprocal

$$\theta = 45^\circ$$

$$\theta = VBL$$

V → Verdet const.

Polarization-insensitive Isolator



① → ② → ③

Circulator