Polarimeter : Accurate measurement of rotation angle Problems and Remedies

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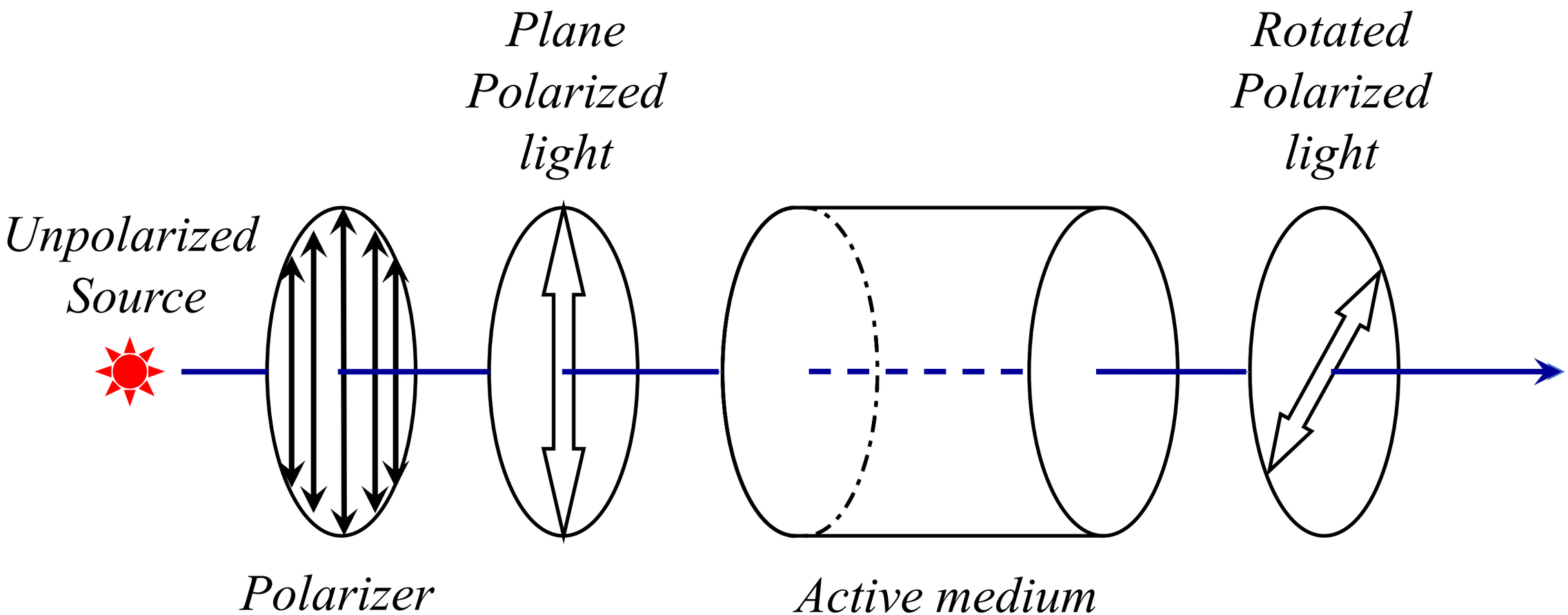
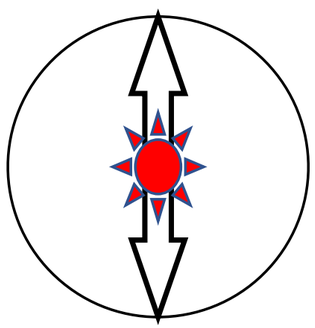
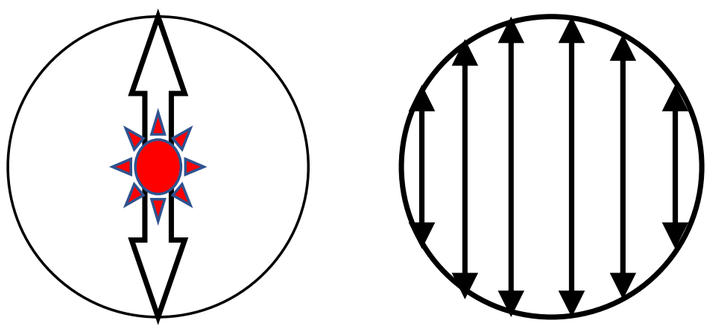
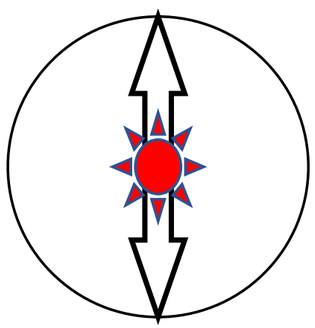

Plane
Polarized
light
Rotated
Polarized
light
Unpolarized
Source
Polarizer
Active medium

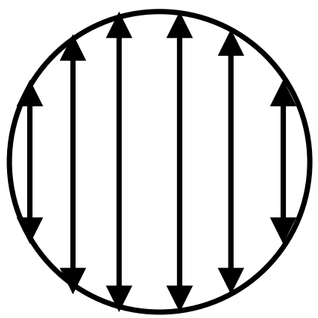


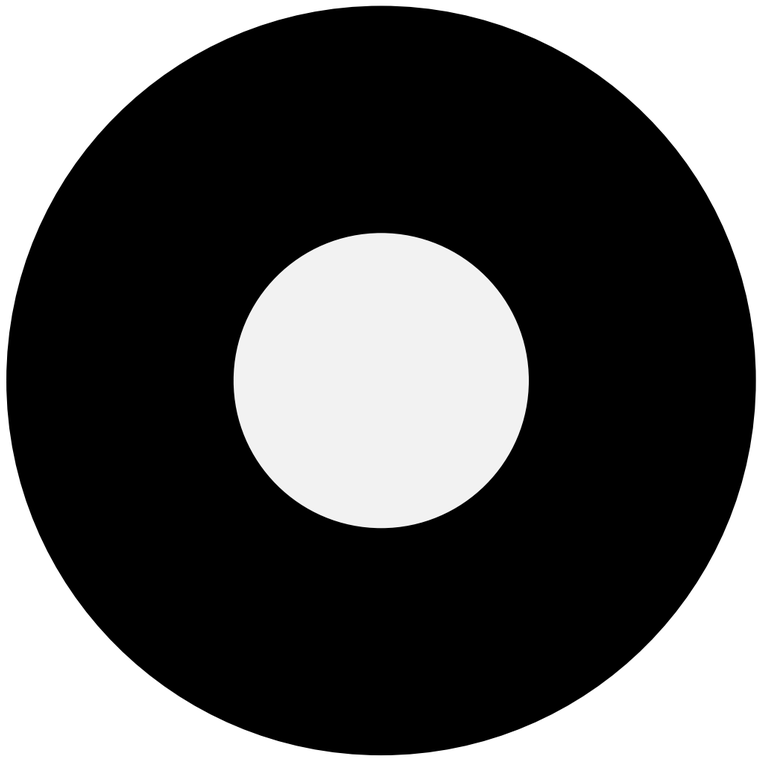
Plane polarized light



Polarizer

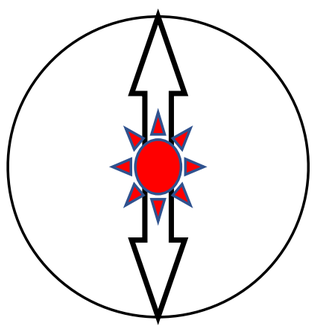


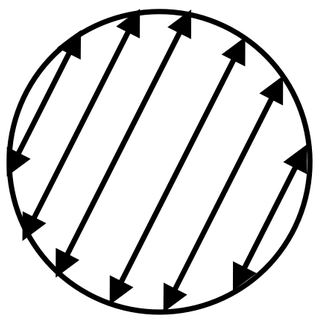


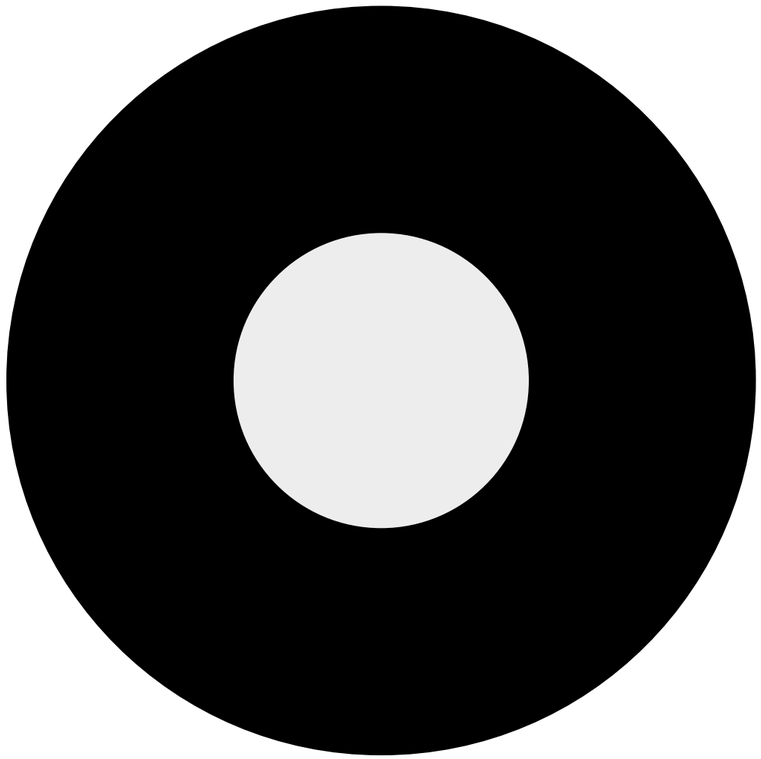


Screen : Bright

Slight rotation

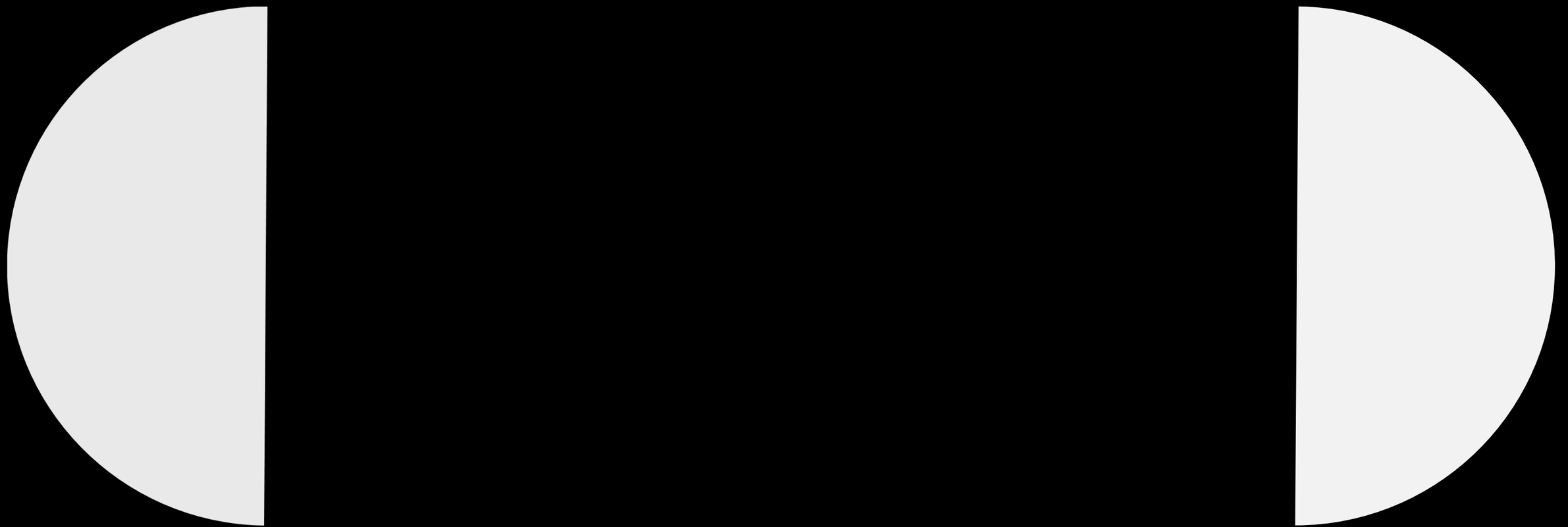






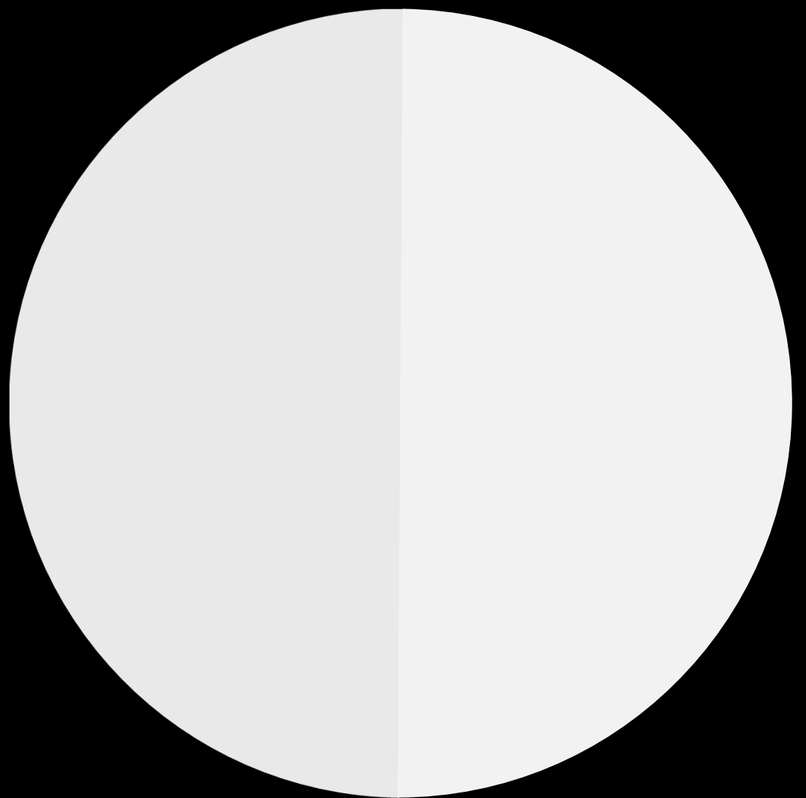
Less bright
but may not be
distinguishable

Simultaneous comparison helps to identify intensity variation due to rotation of polarizer

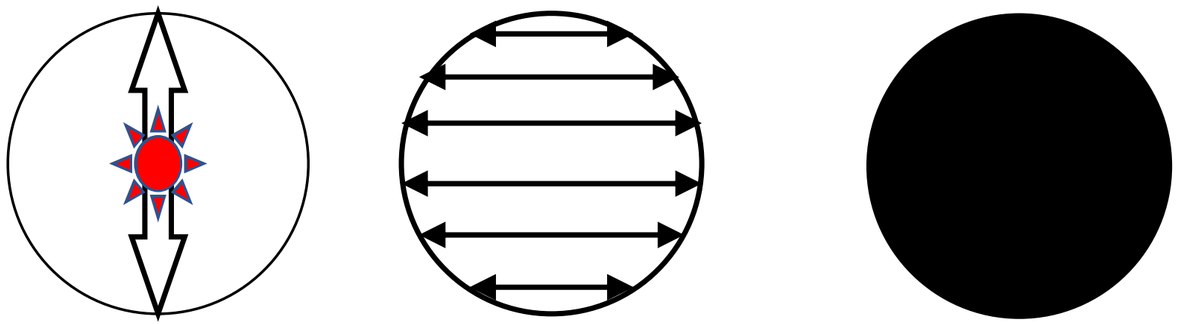


Simultaneous comparison helps to identify intensity variation due to rotation of polarizer

Less bright

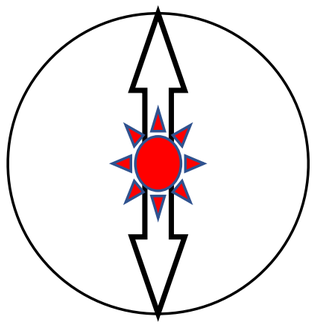


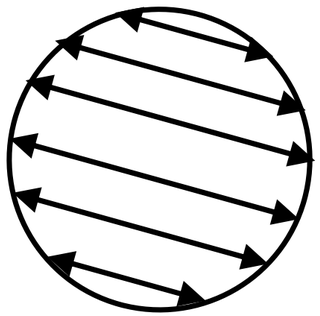
More bright

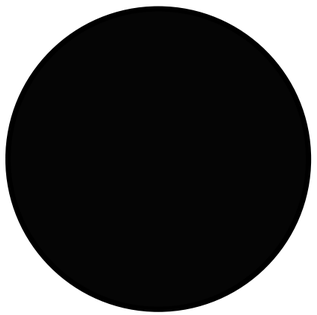


Dark

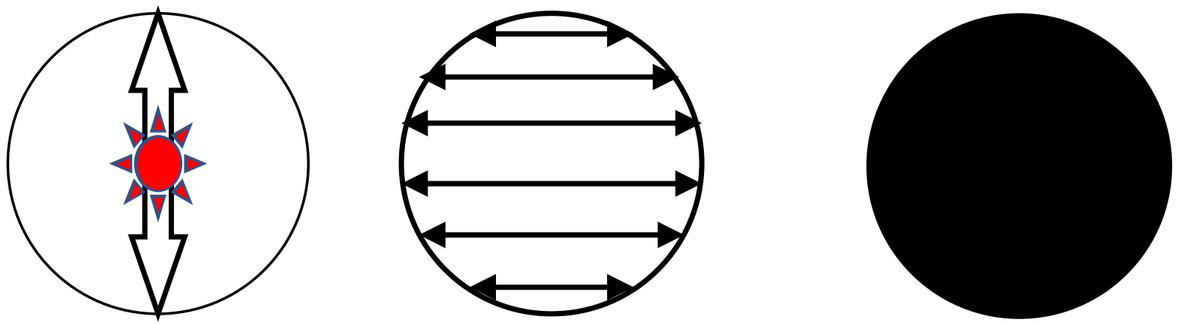
Slight rotation





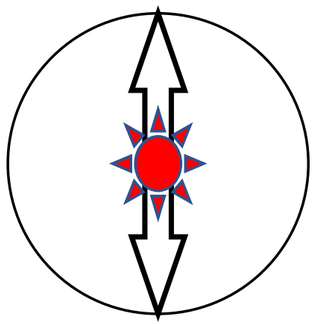


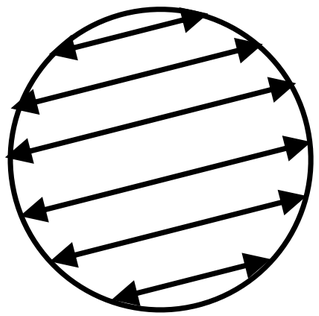
Less dark
but may not be
distinguishable

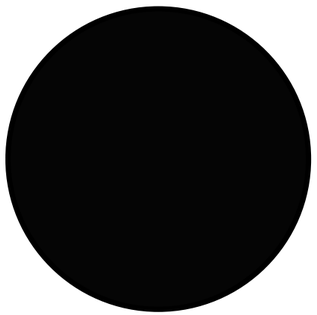


Dark

Slight rotation







Less dark
but may not be
distinguishable

Simultaneous comparison helps to identify intensity variation due to rotation of polarizer

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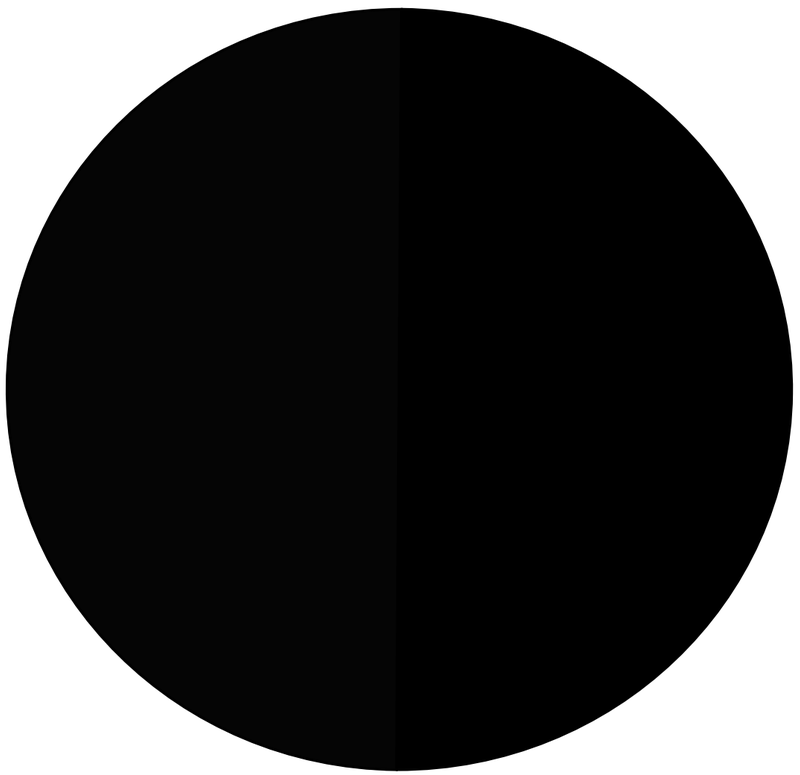
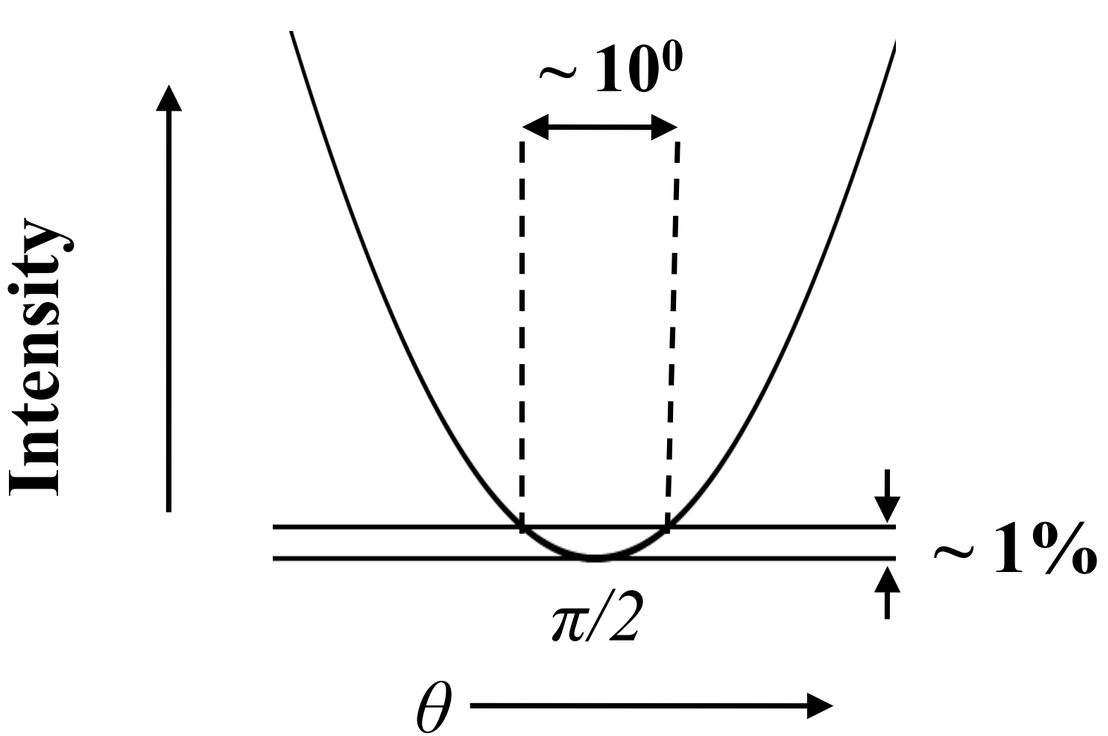
Less dark

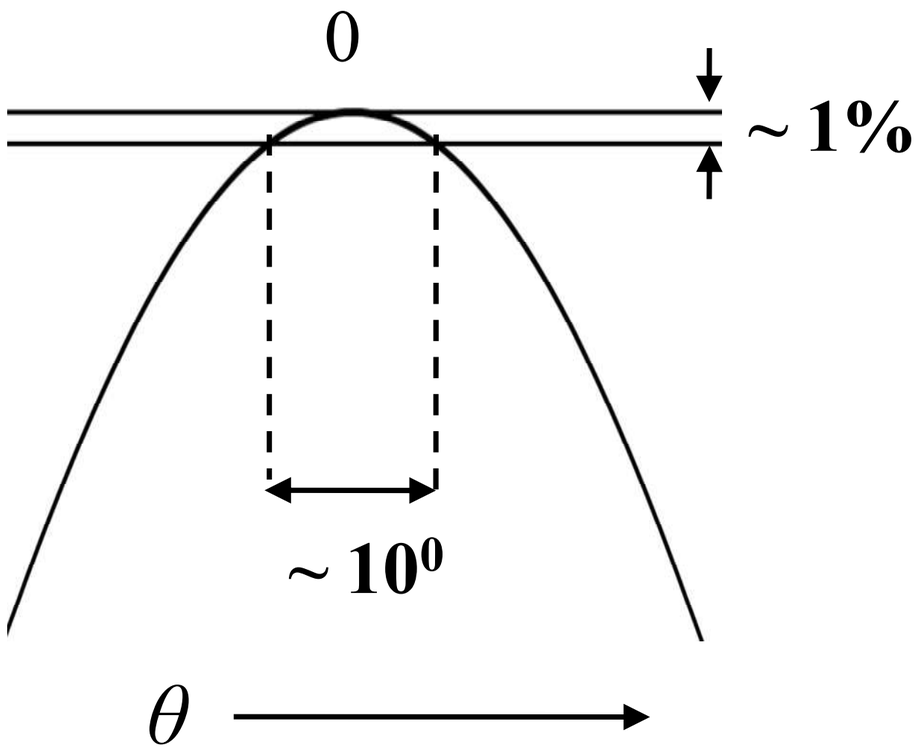


More dark

$$I(\theta) = I_0 \cos^2\theta$$



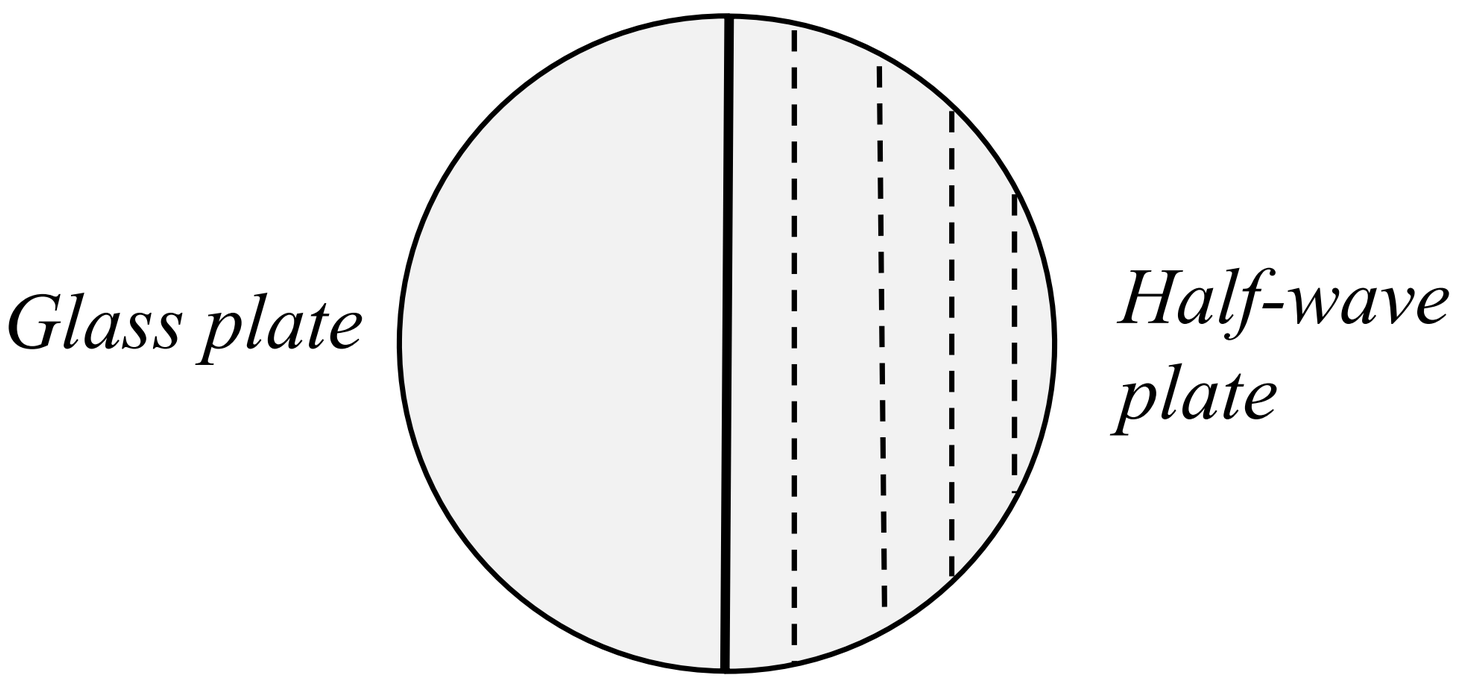
Dark



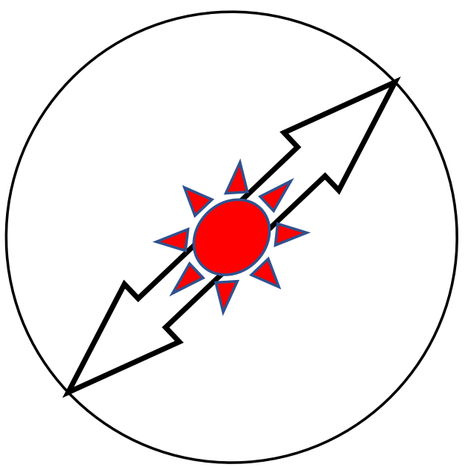
Bright

Laurent half-shade plate

- Two semi-circular components :
  - Plane glass plate
  - Half-wave plate
- Both are of identical optical absorptivity

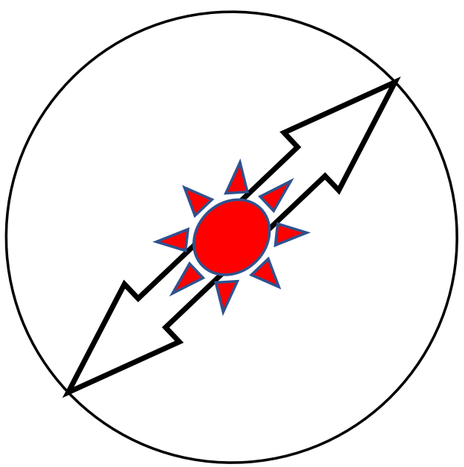


Plane polarized light through HWP

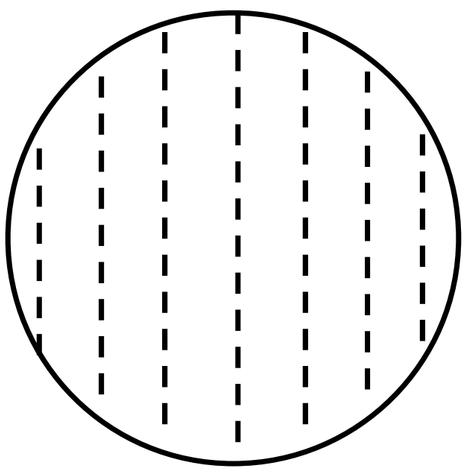


$$\begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

Plane polarized light through HWP

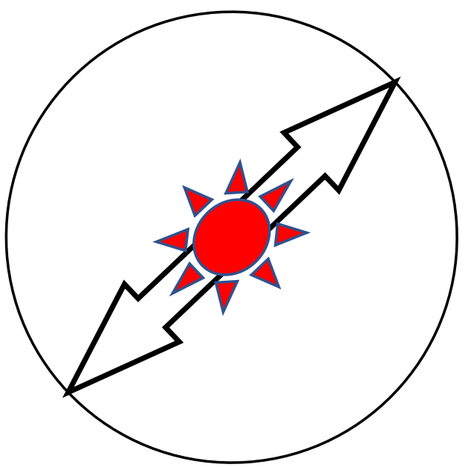


$\begin{pmatrix} 1 \\ 1 \end{pmatrix}$

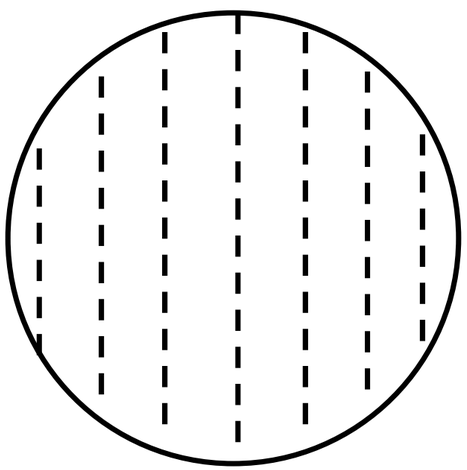


HWP

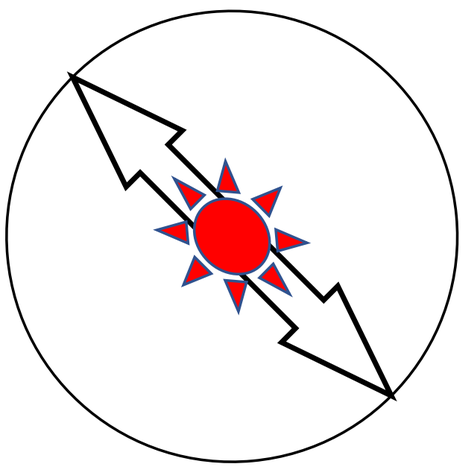
Plane polarized light through HWP



$\begin{pmatrix} 1 \\ 1 \end{pmatrix}$

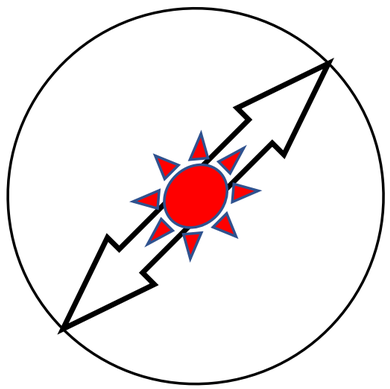


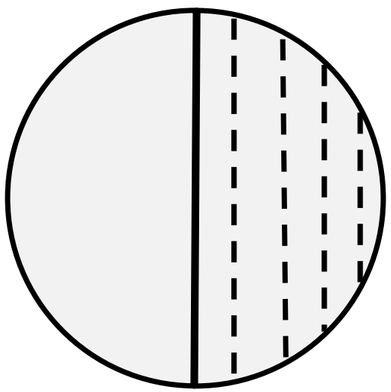
HWP



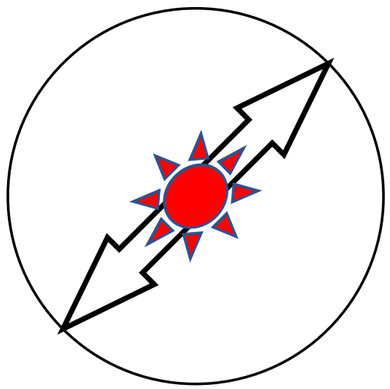
$\begin{pmatrix} 1 \\ -1 \end{pmatrix}$

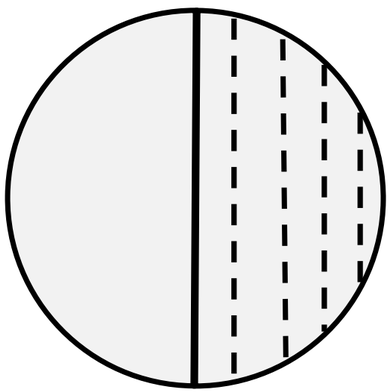
Plane of polarization rotated by 90^o





Laurent Half-shade plate





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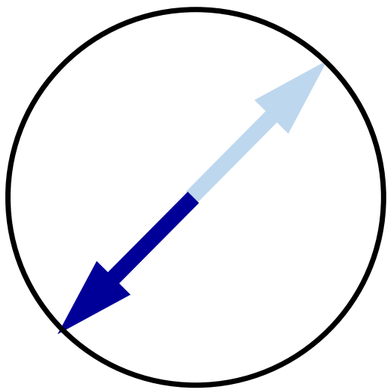
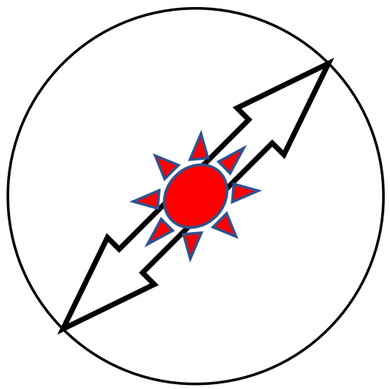
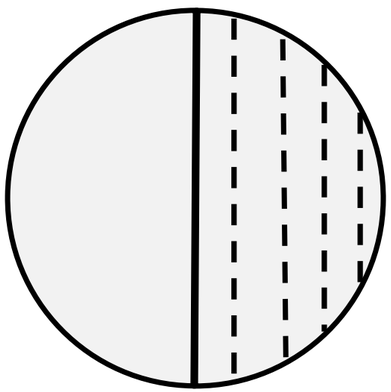


Emergent light





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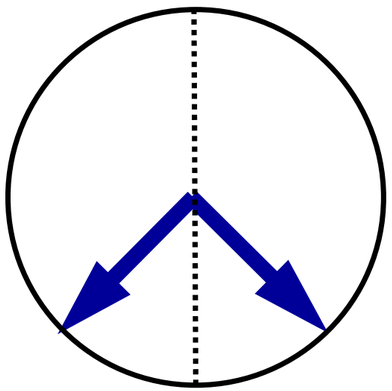
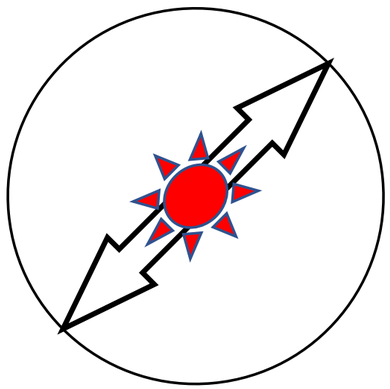
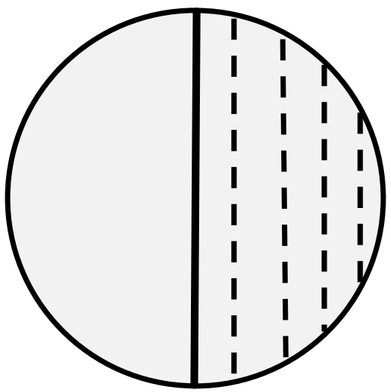


Emergent light





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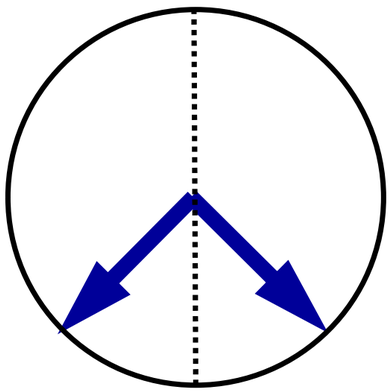
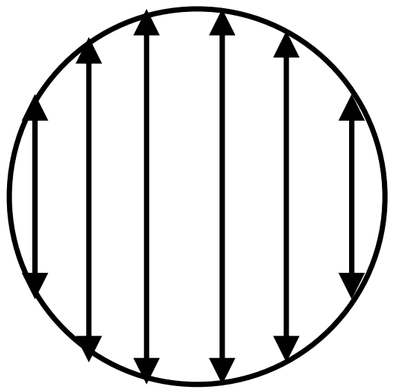
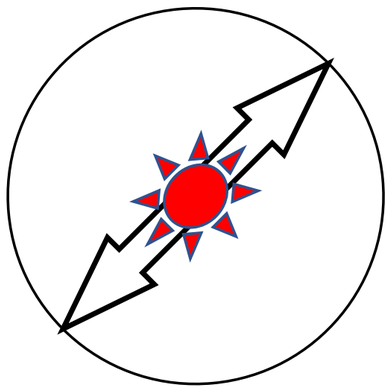
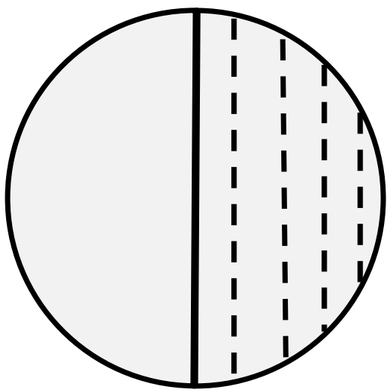


Emergent light



Polarizer





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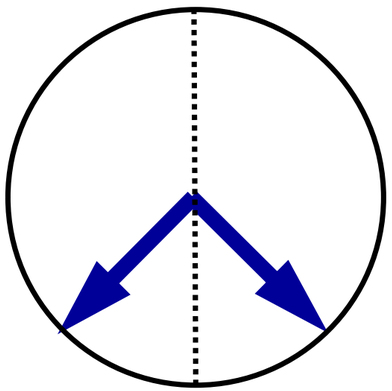
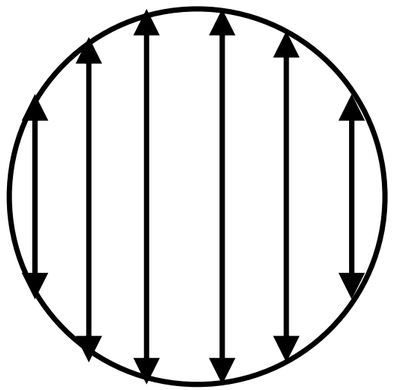
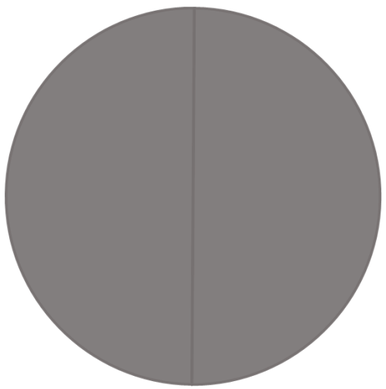


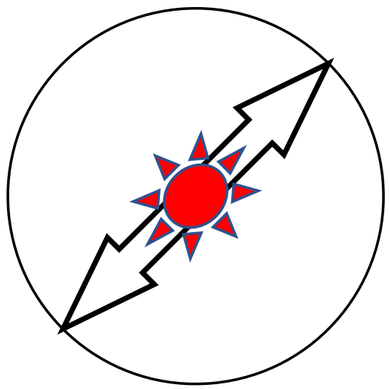
Emergent light

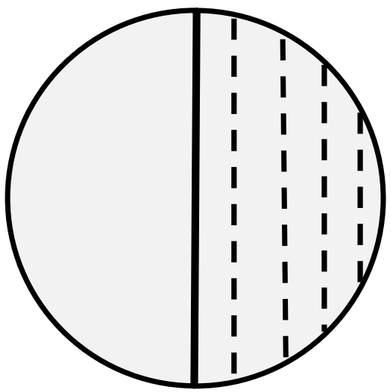


Polarizer

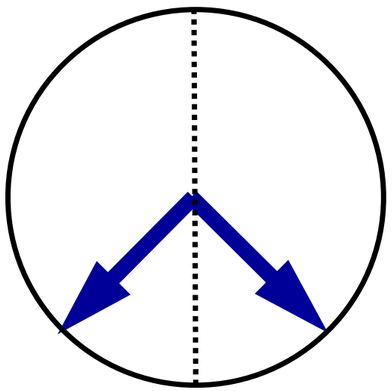


Screen: equal intensity both side

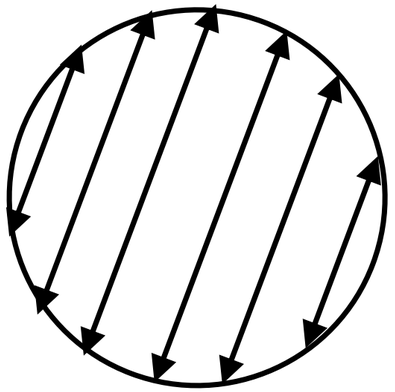




Laurent Half-shade plate

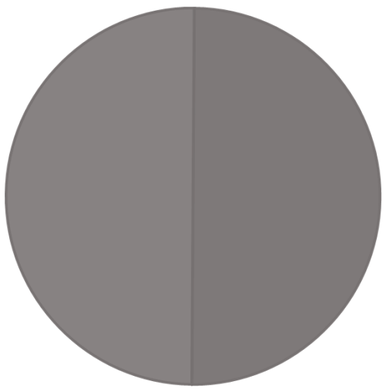


Emergent light

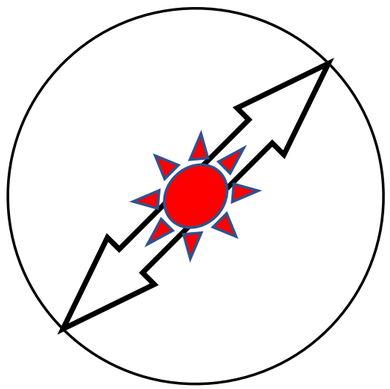


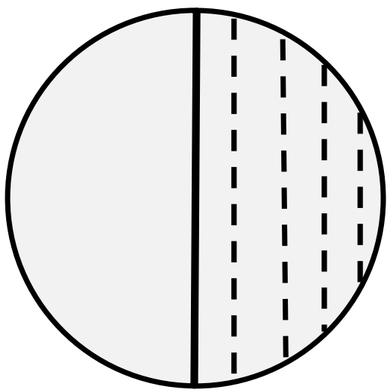
Polarizer

Slight rotation

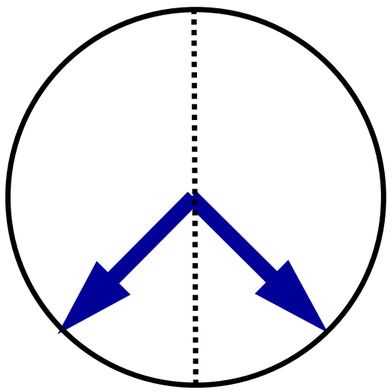


unequal intensity both side

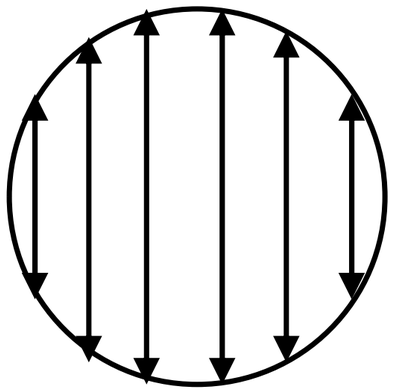




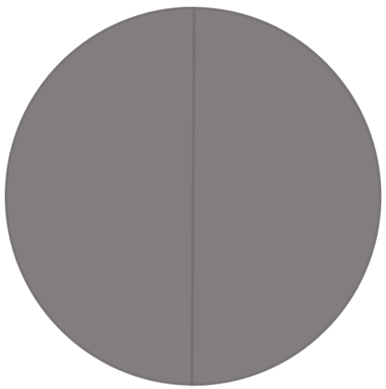
Laurent Half-shade plate



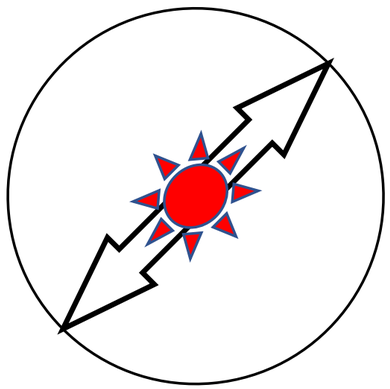
Emergent light

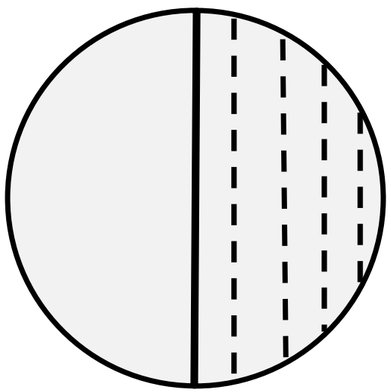


Polarizer

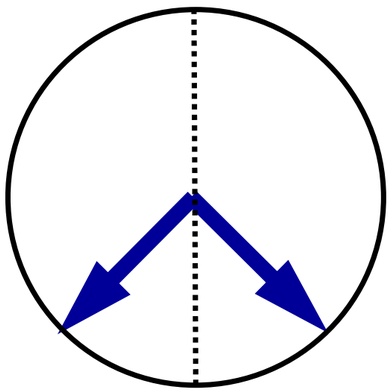


equal intensity both side

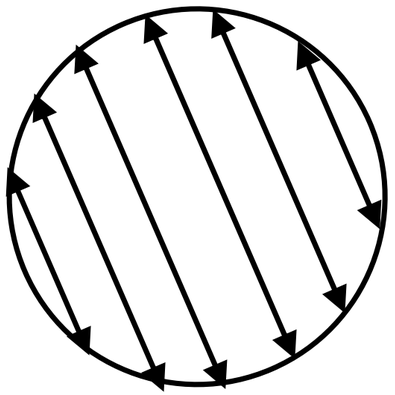




Laurent Half-shade plate

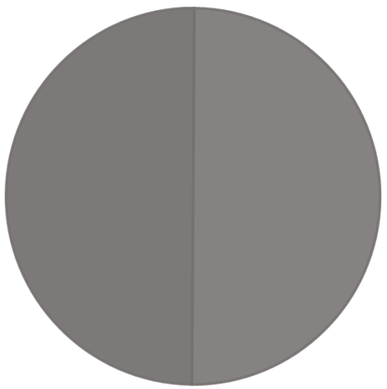


Emergent light



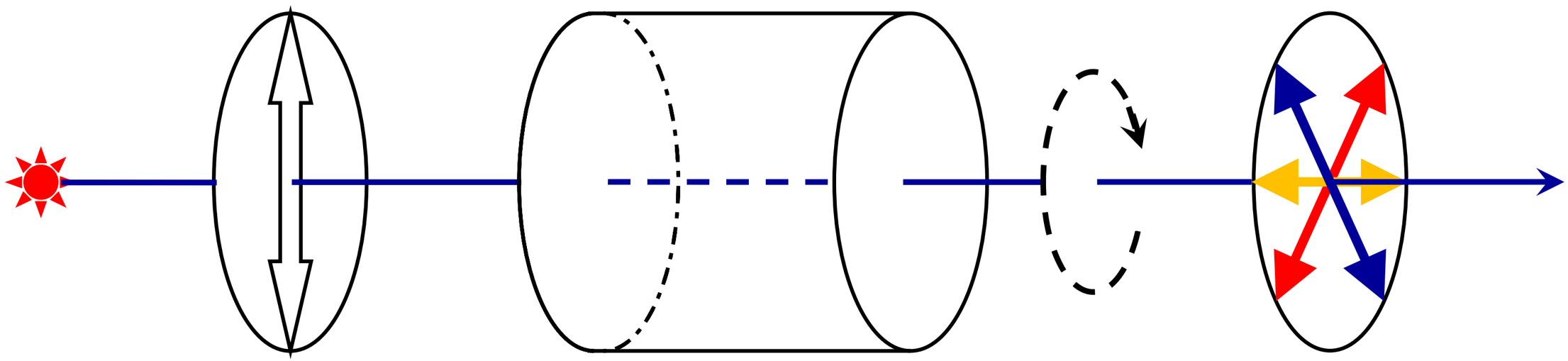
Polarizer

Slight rotation



unequal intensity both side

Rotatory dispersion

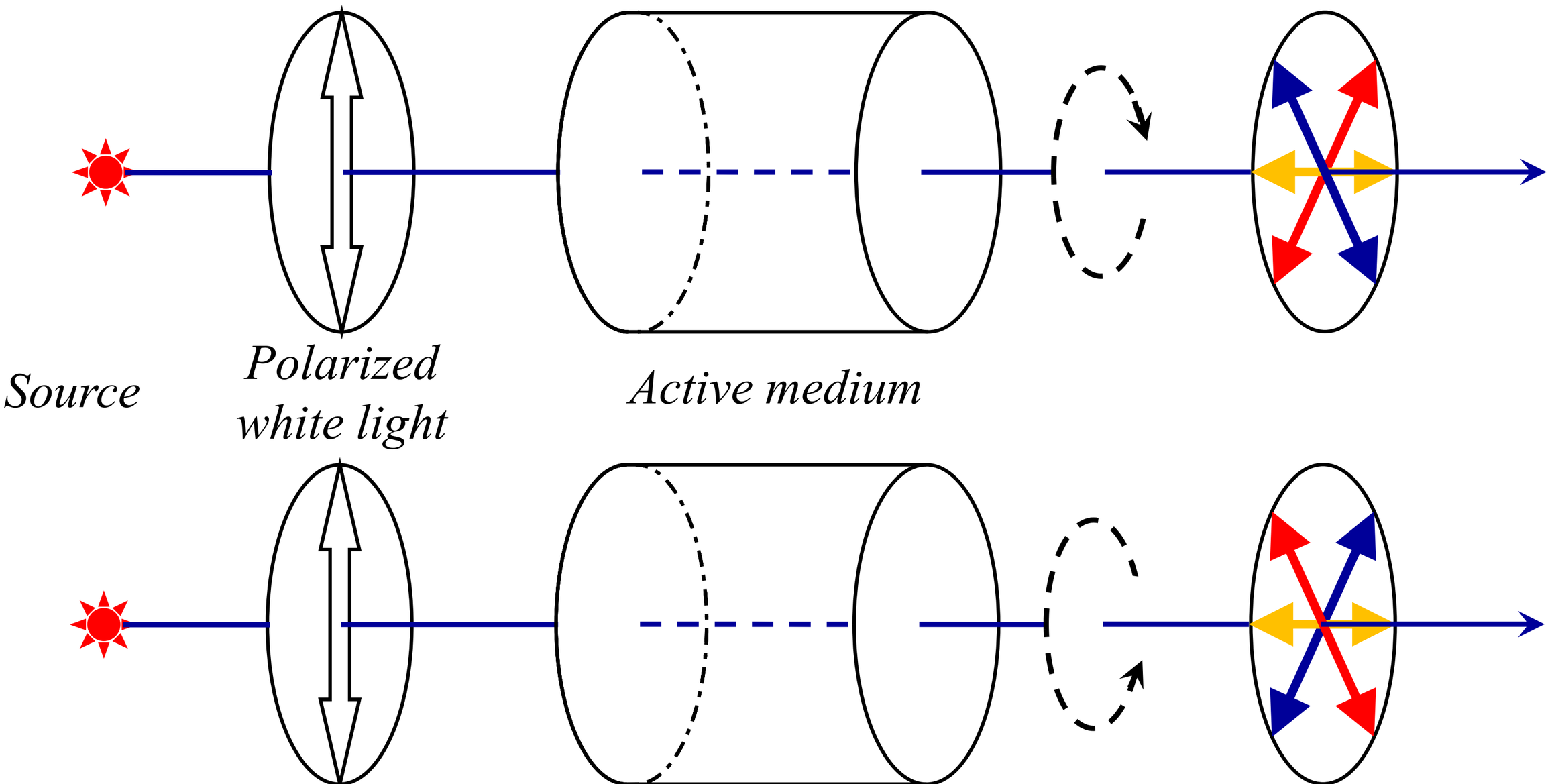


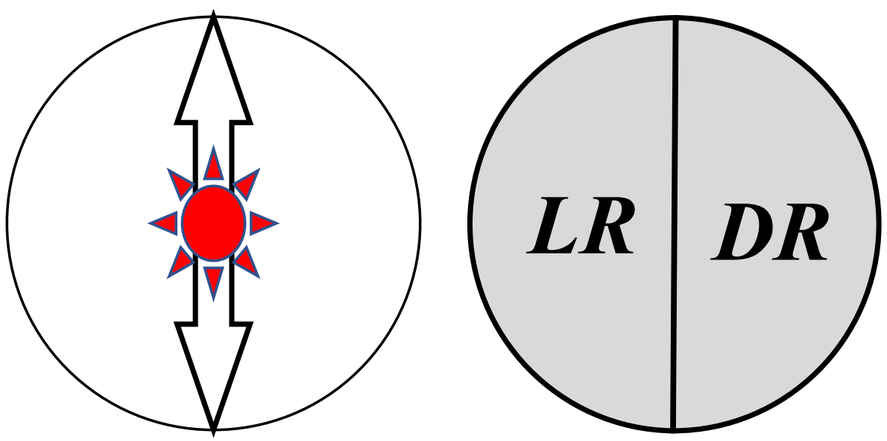
Source

Polarized white light

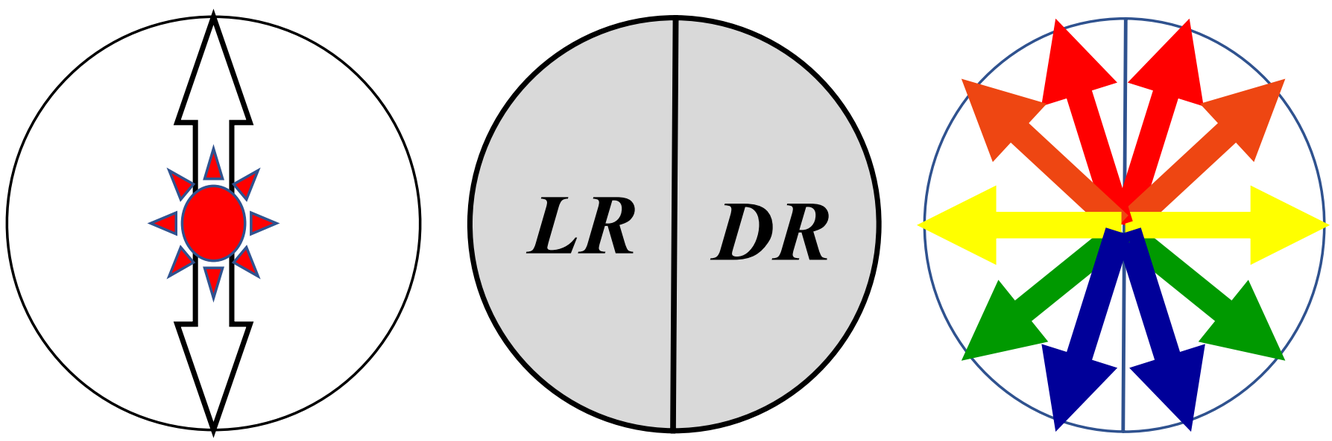
Active medium

Rotatory dispersion



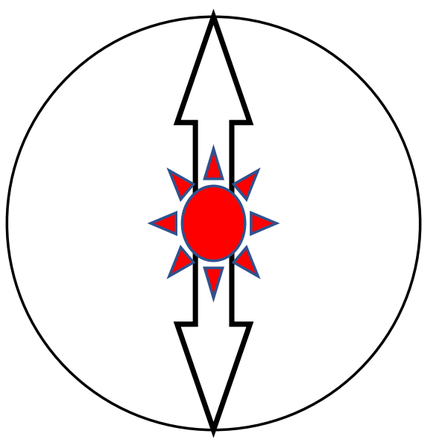


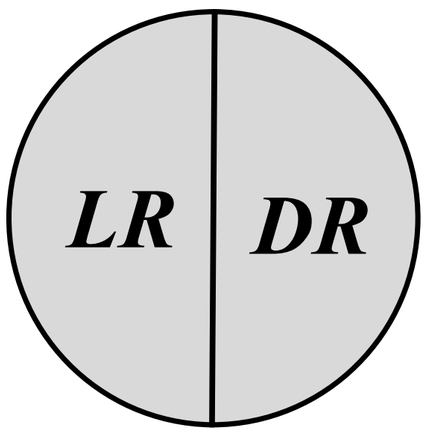
Bi-quartz plate



Bi-quartz plate

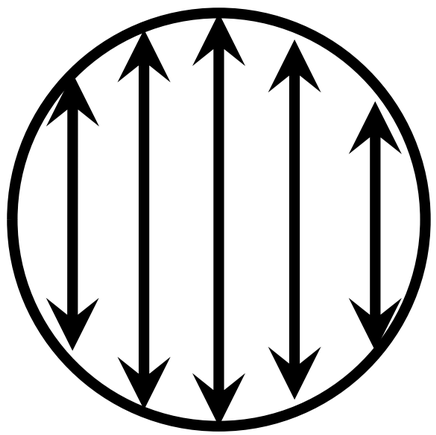
Emergent light



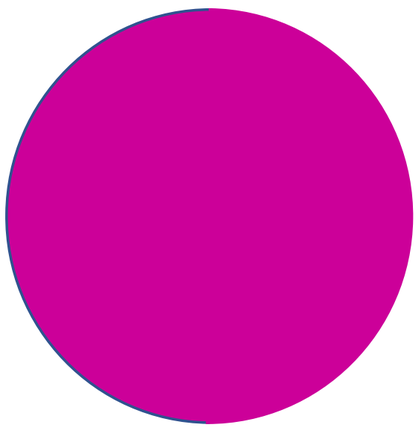


Bi-quartz plate

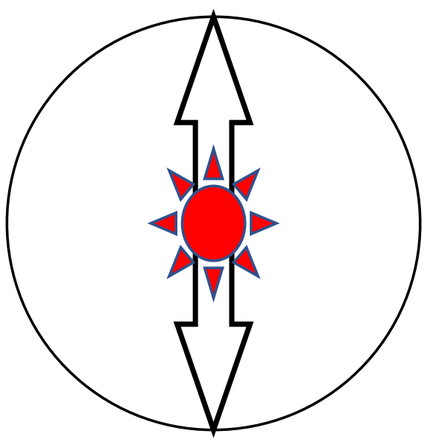
Emergent light

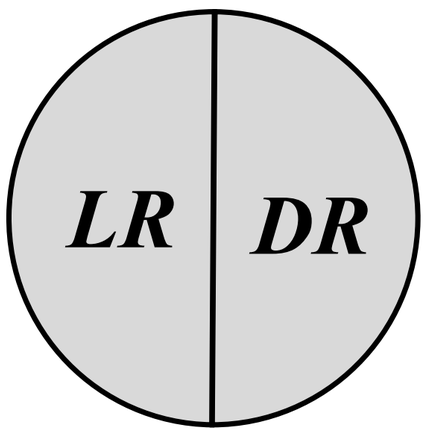


Polarizer



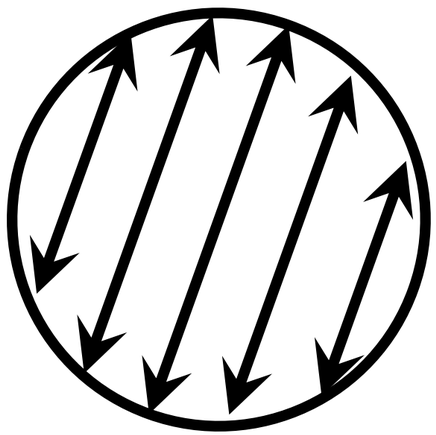
Screen: Uniform coloration





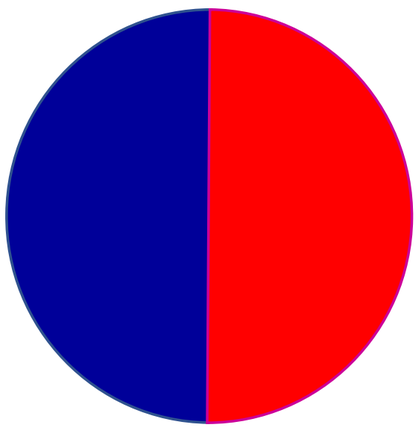
Bi-quartz plate

Emergent light

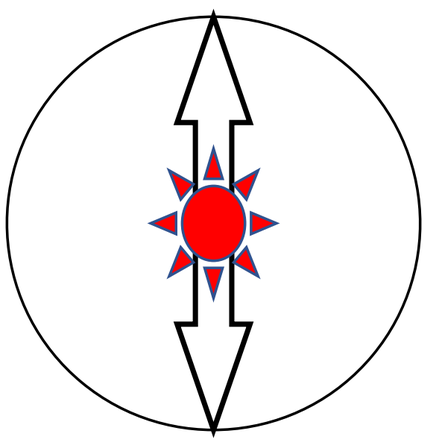


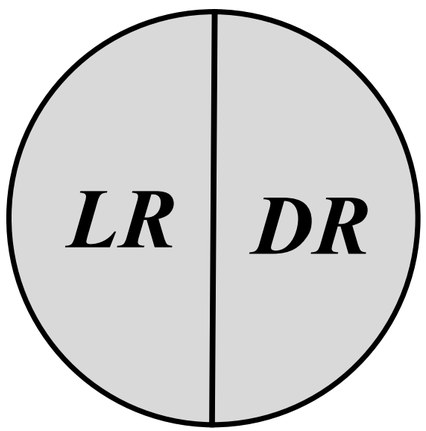
Polarizer

Slight rotation



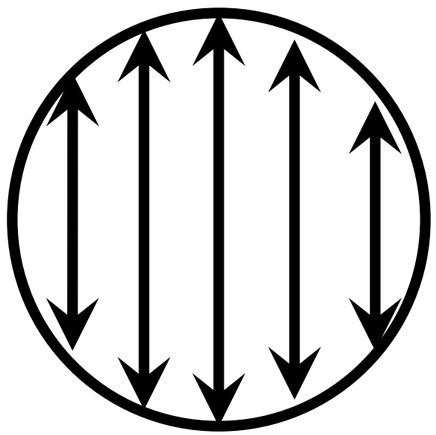
Screen: Distinct coloration



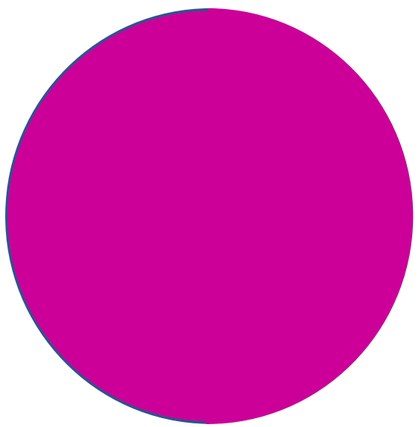


Bi-quartz plate

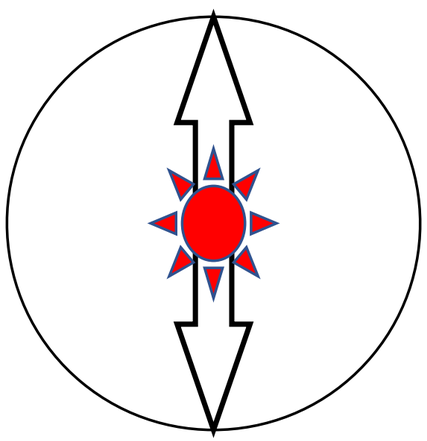
Emergent light

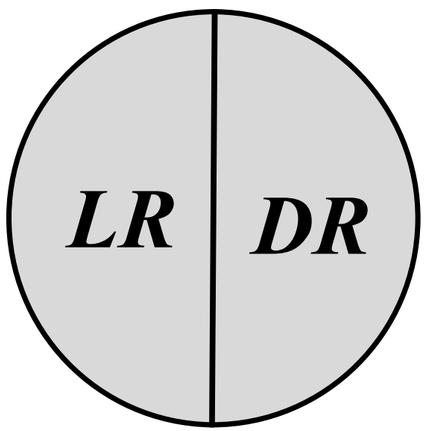


Polarizer



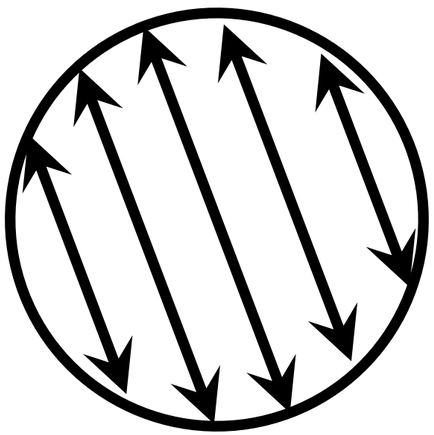
Screen: uniform coloration





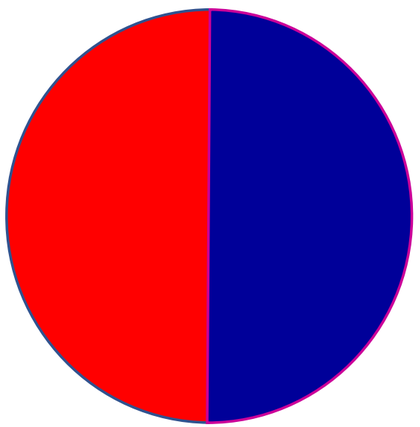
Bi-quartz plate

Emergent light



Polarizer

Slight rotation



Screen: Distinct coloration