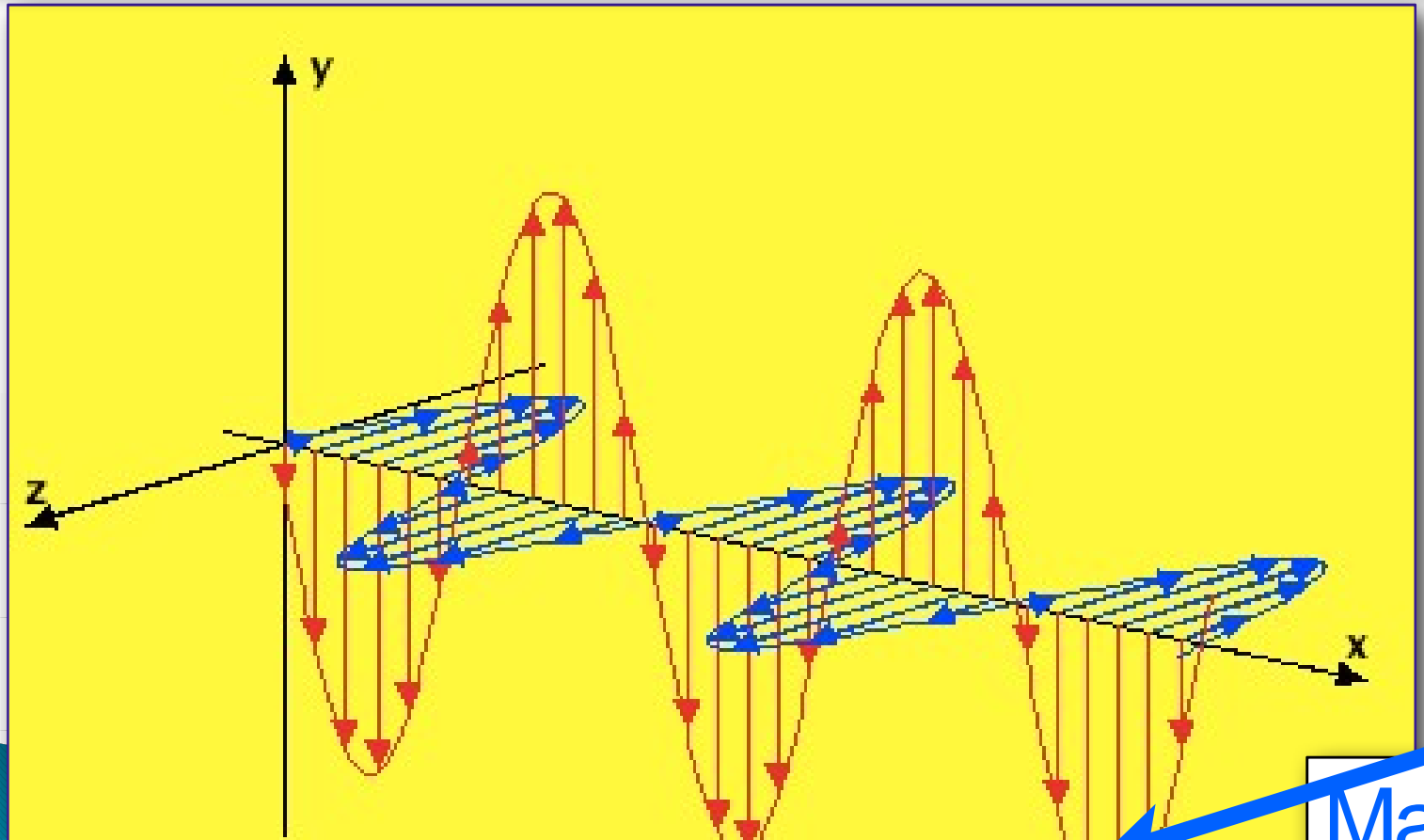
Jessy.K.Benny
Polarisation
2019-20

EM wave

An electromagnetic wave consists of sinusoidally varying electric and magnetic fields which oscillate at right angles to each other. The wave energy travels perpendicularly to these fields.

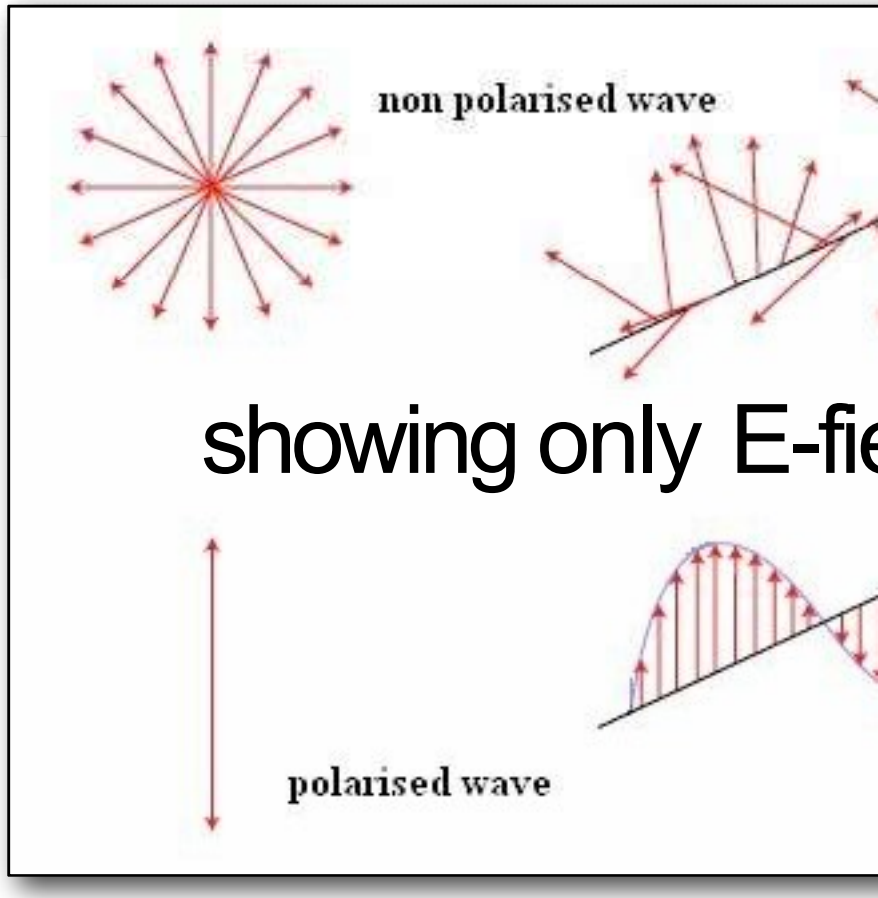


Electric field

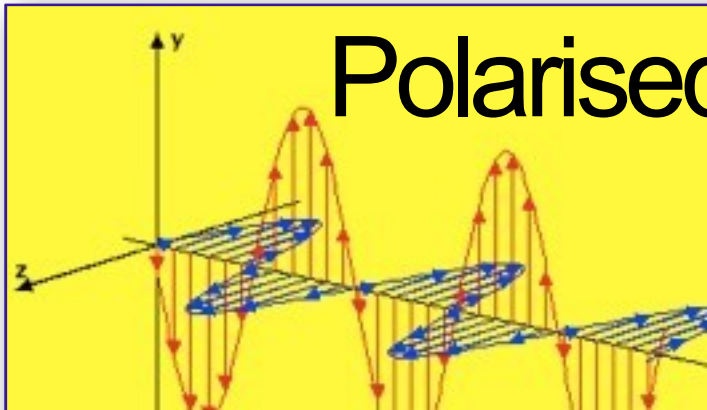
Magnetic

Plane polarisation

nt from most sources eg
Sun has its electric and
magnetic fields in all
ections perpendicular to
ne direction of travel.

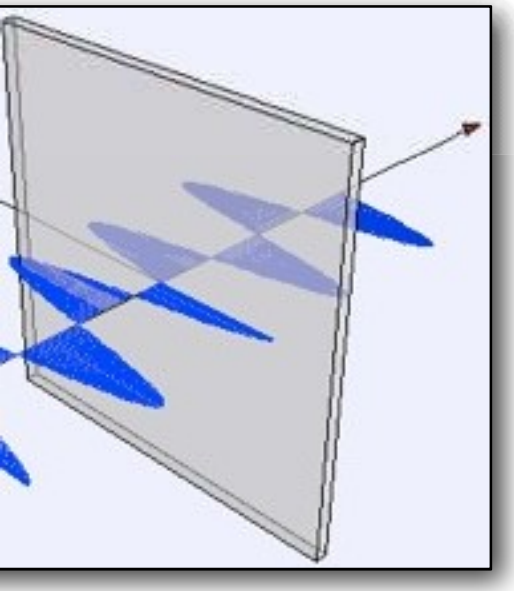


the electric field only
tes in one direction (with
e magnetic field at right
ngles to it), the wave is

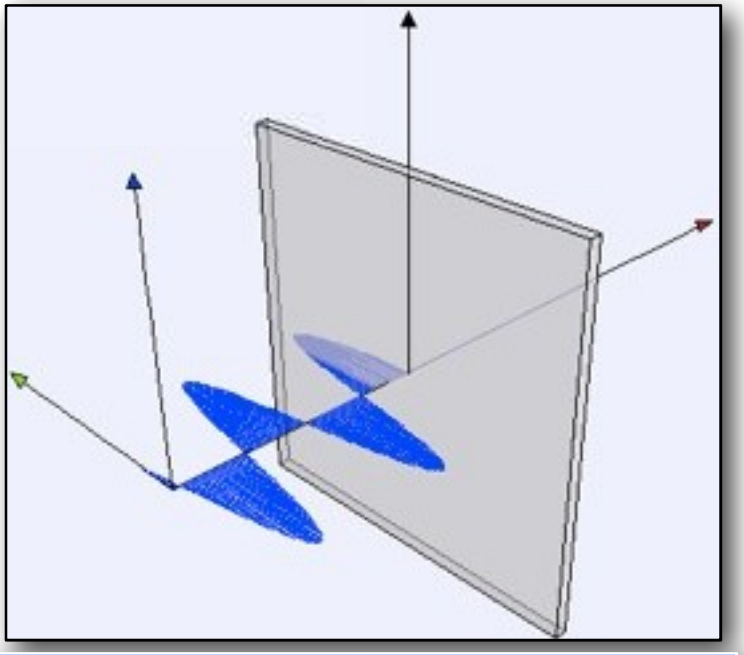


Polaroid

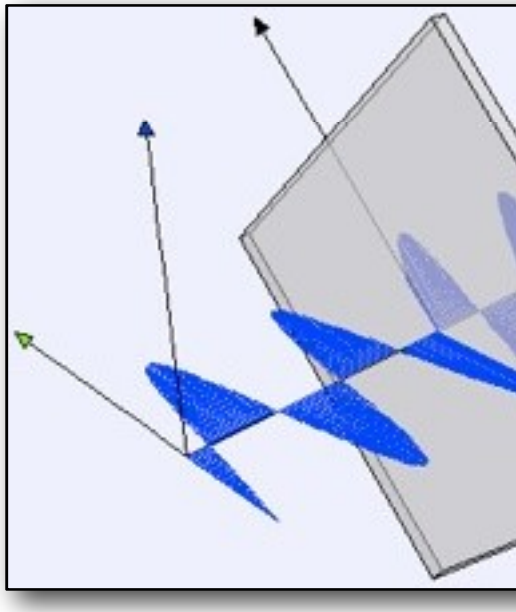
plastic which polarises light as it passes through



plane of the
oid is parallel
he electric
, all of the
ergy of a
rised wave



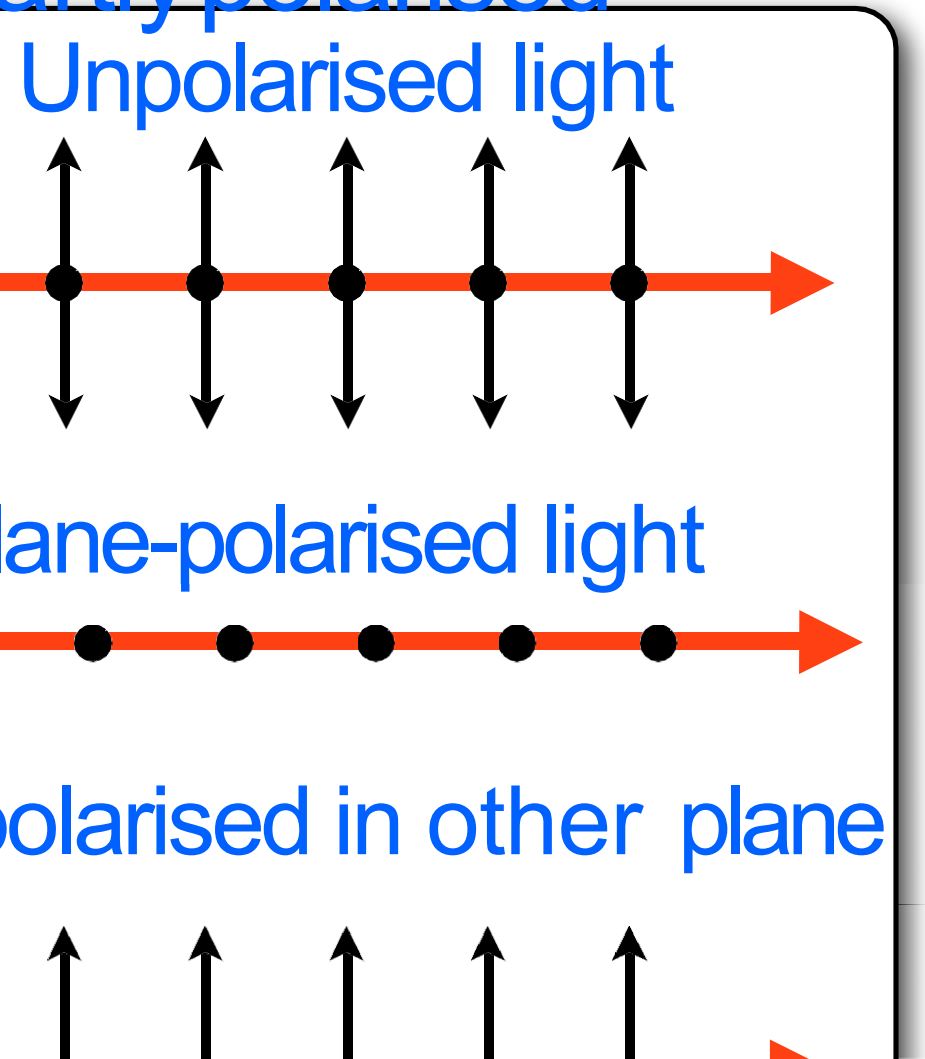
If the plane of the polaroid is perpendicular to the electric field, none of the wave energy passes

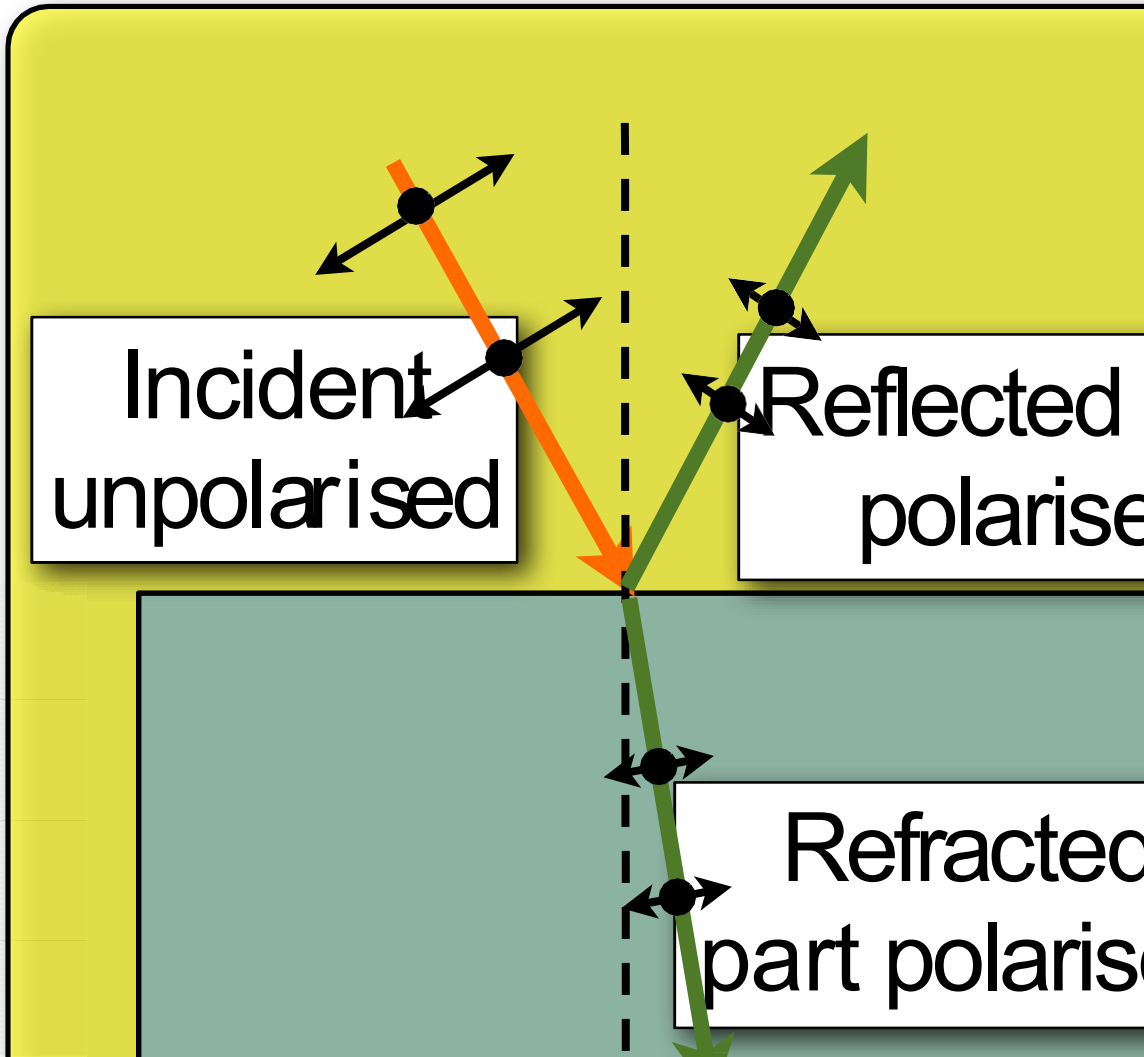


If the plane o
polaroid is a
angle to t
electric field
some of the
energy pas

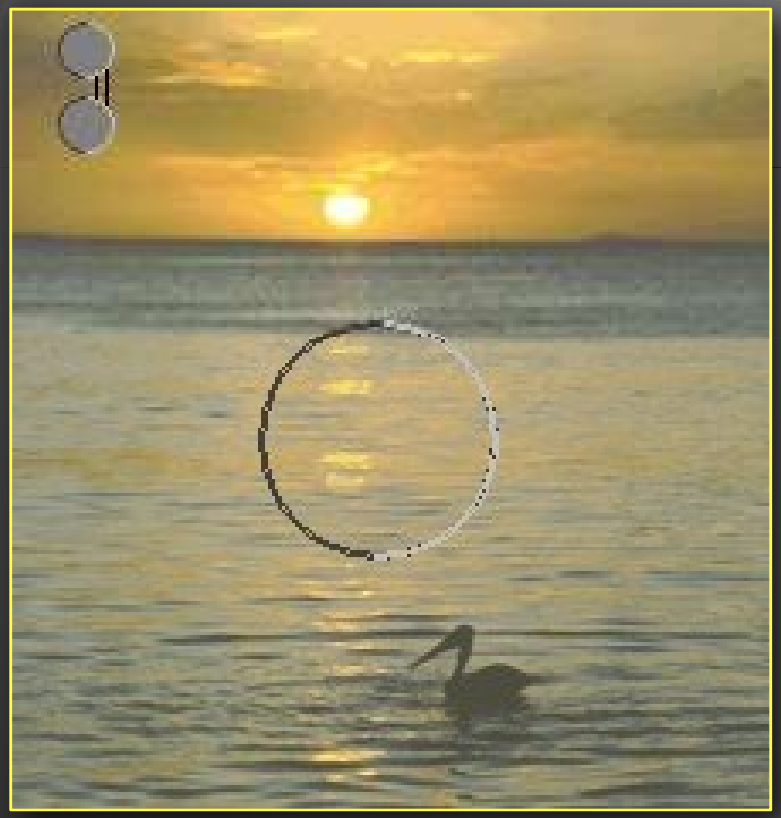
Reflected light

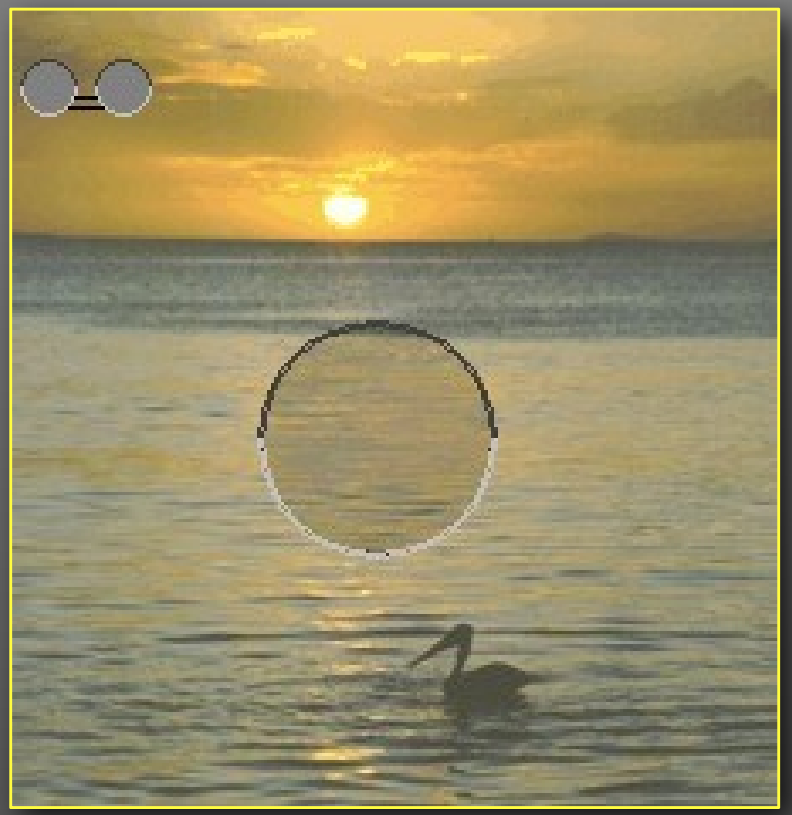
hen light is reflected from a surface it is
reflected and refracted and both wavesar
artly polarised





Polaroid



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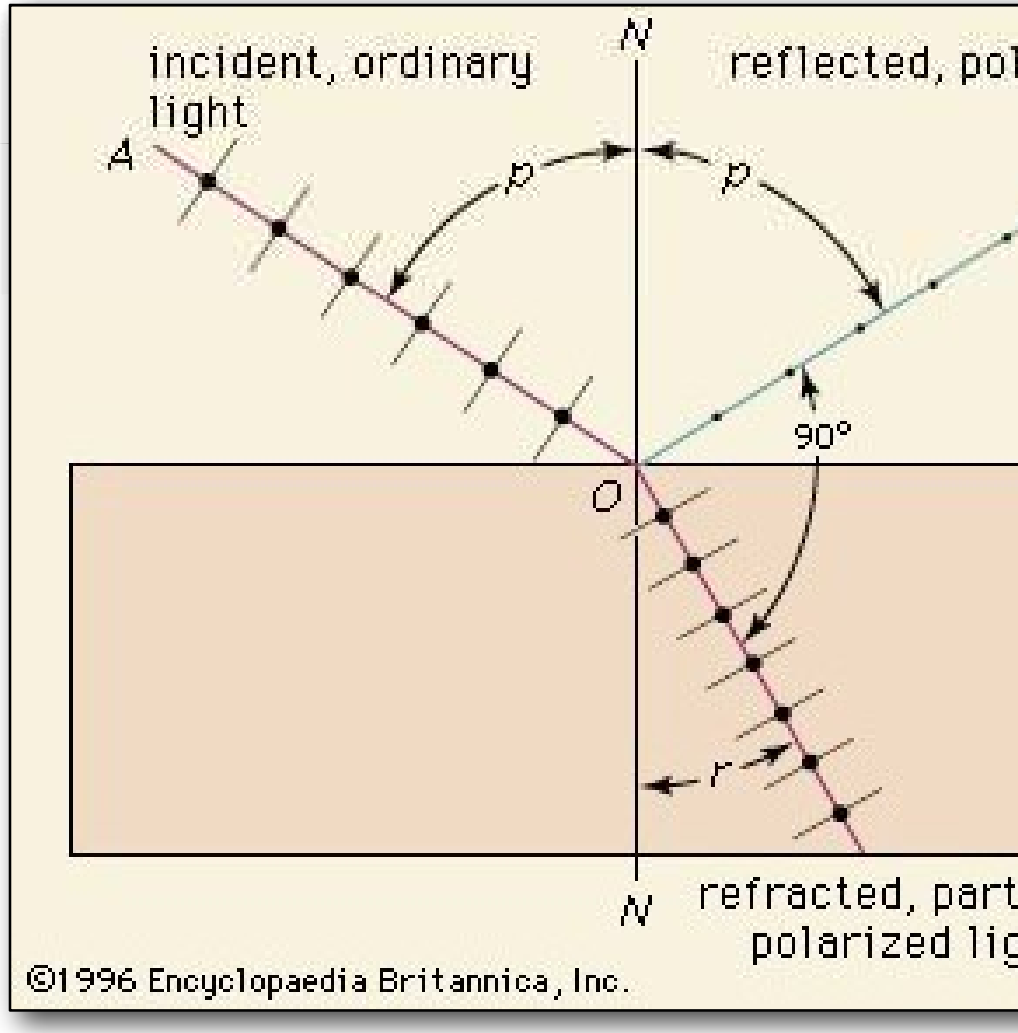
Brewster angle

ght reflected from a
ace is partly polarised.
a certain angle, known
the Brewster angle,
en the refracted and
ected rays are at 90º,
reflected ray is totally
polarised.

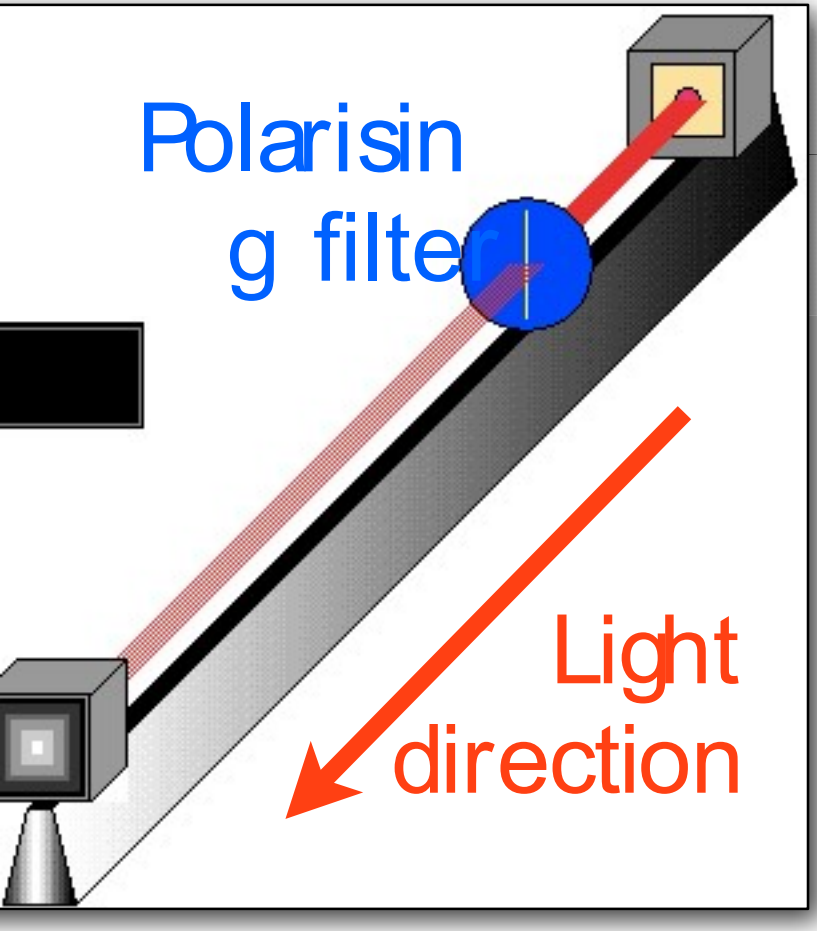


$$n = \tan\phi$$

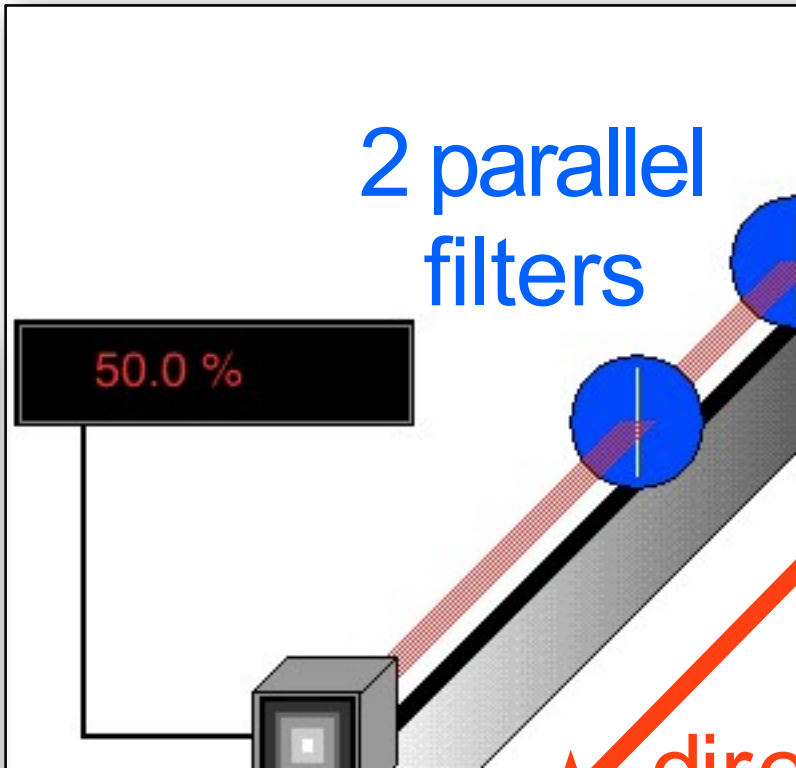
ø is the Brewster angle

eg Brewster angle o
water (n = 1.33),

Polarisation filters

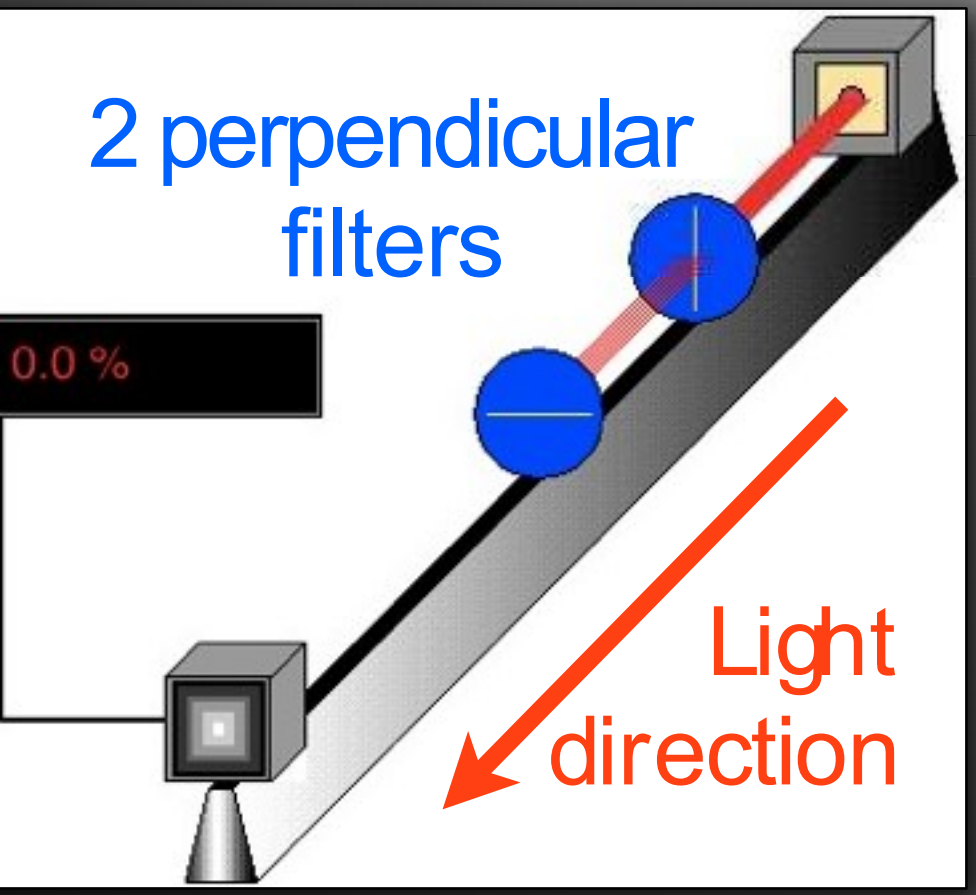


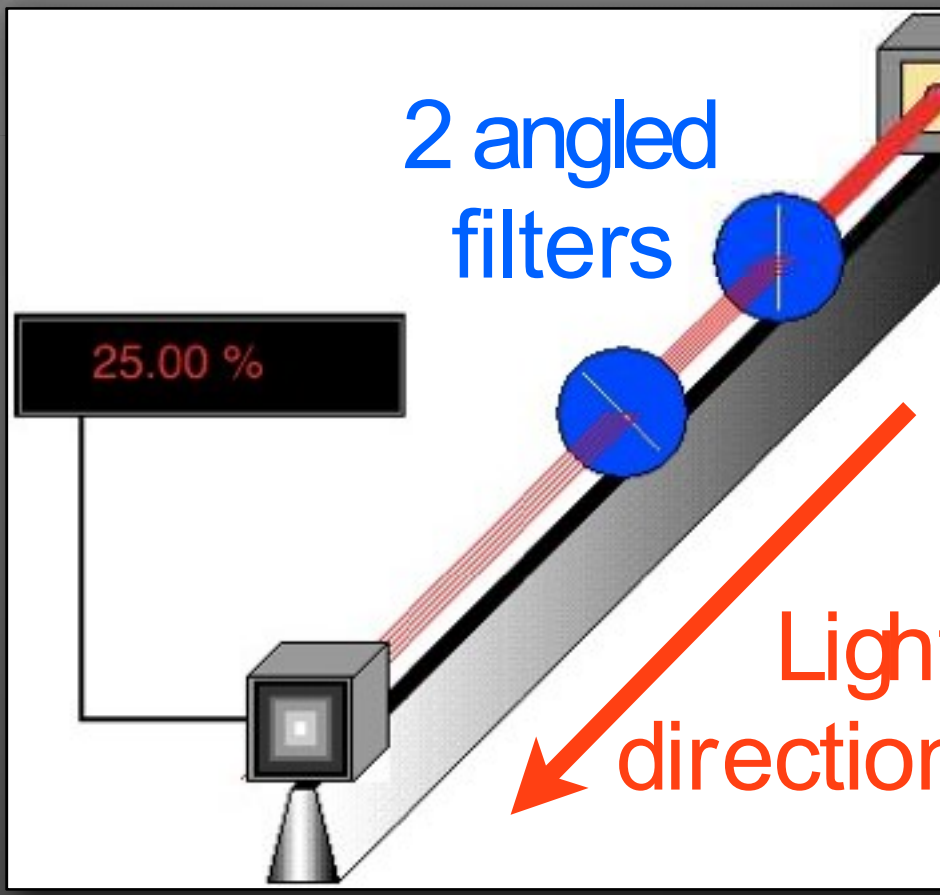
The unpolarised light passes through a polarising filter and the intensity is reduced to 50% whatever the angle of the filter.



If the second filter is aligned with the first one, all of the light polarised by the first filter is transmitted

Filters at an angle



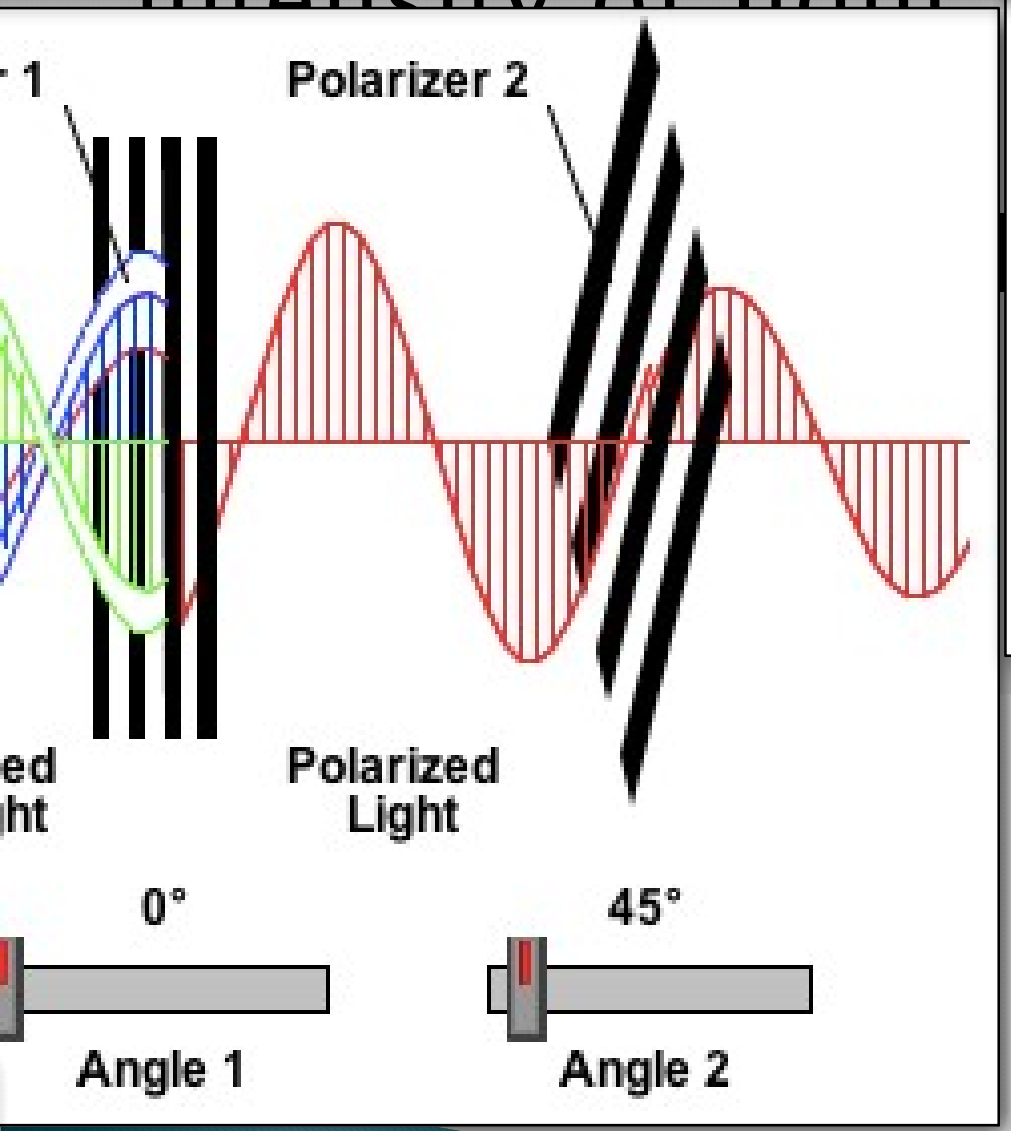


Malus' law

ulates intensity of polarised light incident on a filter

$$I = I_0 \cos$$

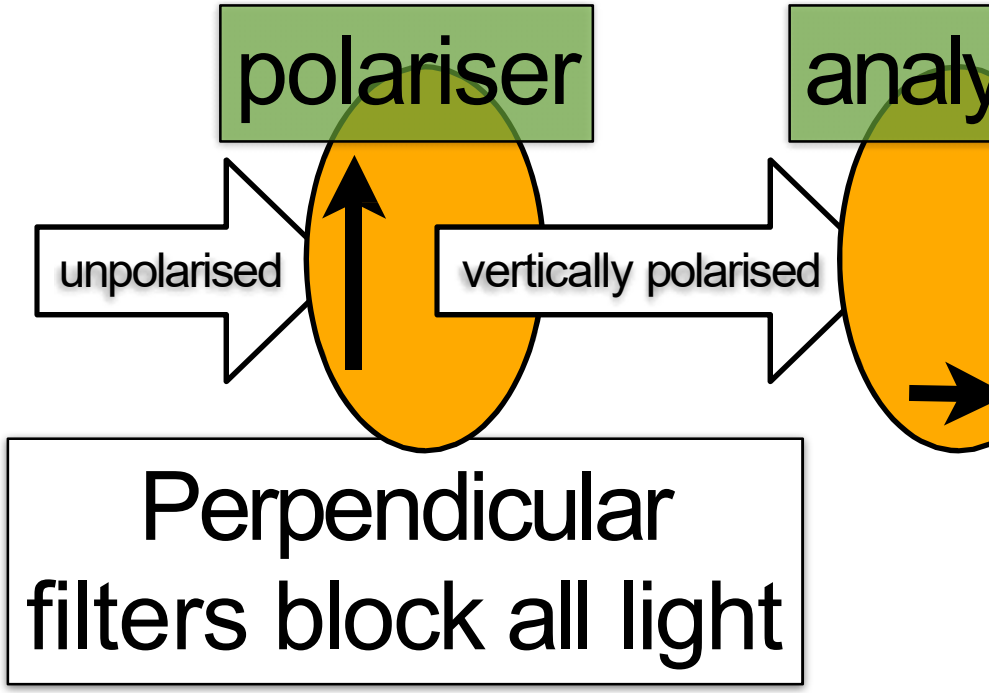
= intensity of light ity of emerging



each other, and I_0 = 400
Wm^{-2}, $I = 400*\cos^2 45$ =
$400*0.7071^2 = 200\,Wm$

Optical activity

ally active
ances (eg strong
solution) rotate the
of polarisation.This
e demonstrated by
g sugar solution
een a polariser and
alyser which will
e the intensity of
merging light.



Light with rotate
of polarisation e