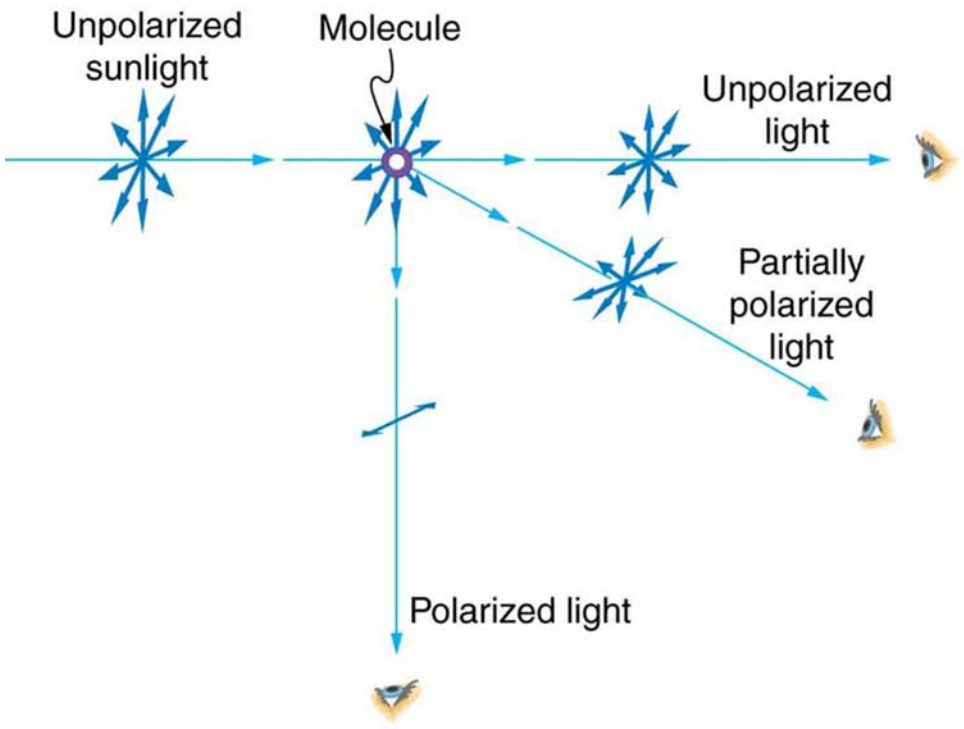
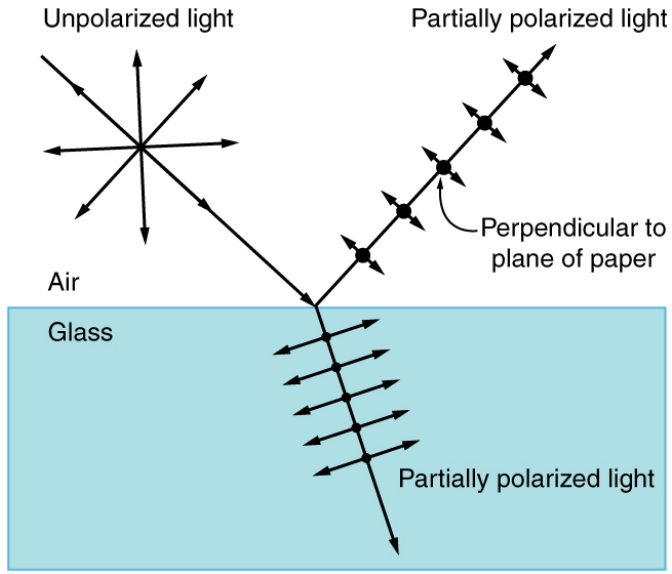
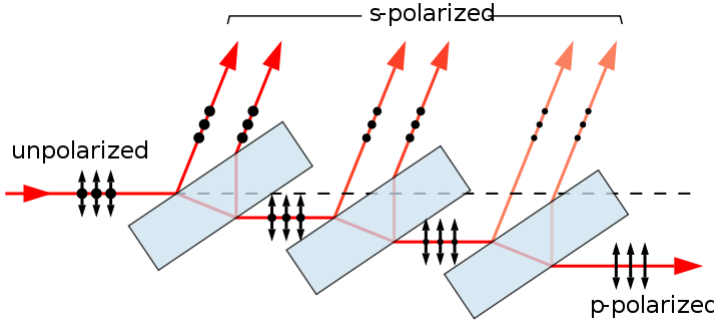
Η Πόλωση του Φωτός στην Φύση

Σκέδαση από Μόρια στην Ατμόσφαιρα



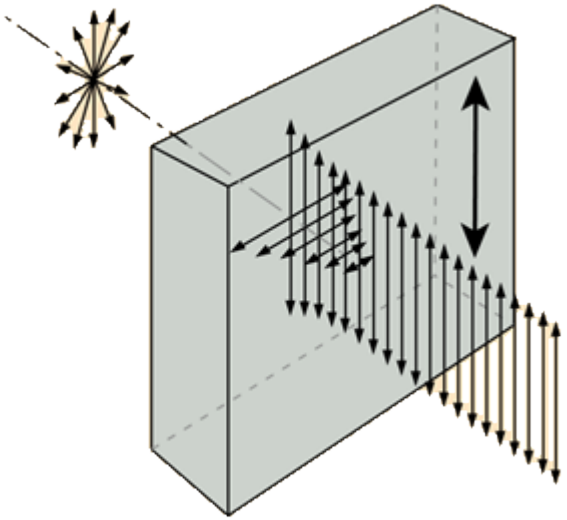
Ανάκλαση & Διάθλαση σε Διαχωριστικές Επιφάνειες



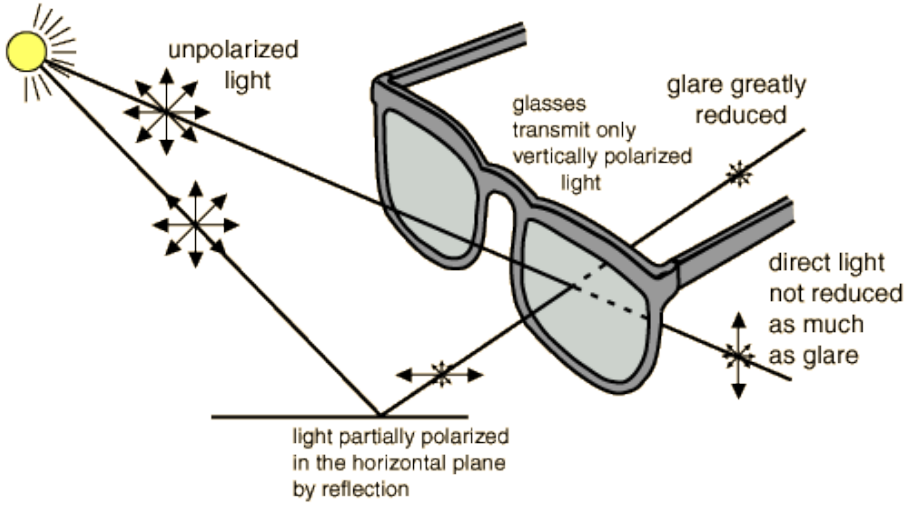


Εφαρμογές της Πόλωσης του Φωτός

Διχρωισμός (Dichroism)



Polaroid Glasses



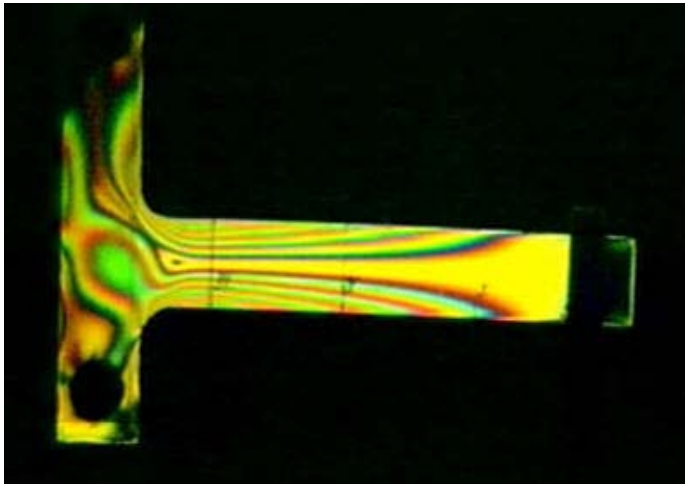
http://hyperphysics.phy-astr.gsu.edu/hbase/phyopt/polabs.html

Εφαρμογές της Πόλωσης του Φωτός

Photographic Filters
When light reflects off water it becomes polarized. Such light is often called glare and can make it harder to see what's behind it. Photographers often use filters to cut out glare and get better pictures.

3 D films
When you watch a 3D film you are actually watching two films shot with different cameras, looking at the same thing but from slightly different angles. When the films are projected the light is polarised and polaroid filters, worn as glasses, can let just one of the films into each eye.

Liquid Crystal (LCD) Displays
There are some crystals that become aligned when an electric field is put across them. When this happens they act as polarising filters.

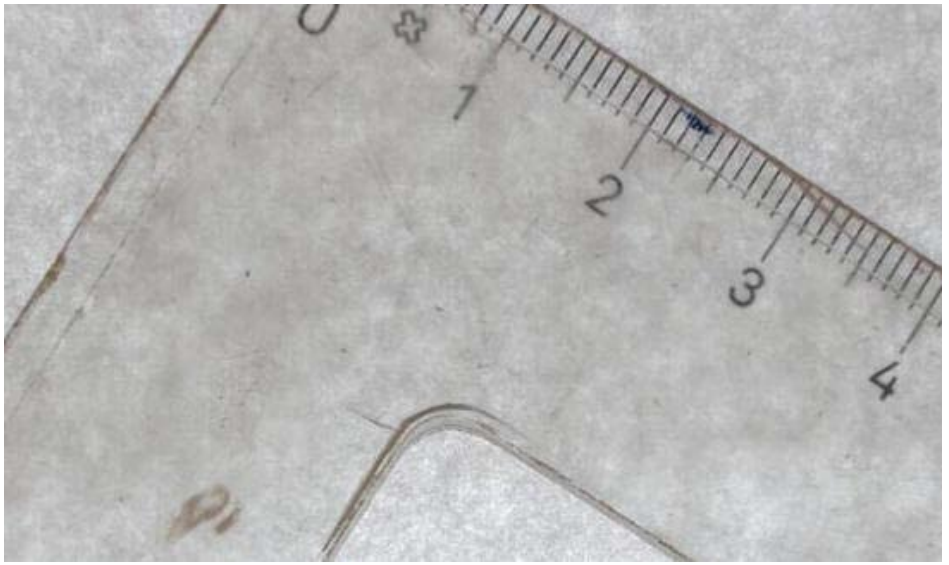


Stress Analysis
When light passes through some materials its plane of polarisation is rotated. The thicker the material the more it is rotated and different colours are rotated by different amounts. To investigate the stresses in an engineering part you could make a model of it in plastic, pass light through and then put it under stress. The patterns produced which may give an indication of where the material has been deformed.

http://www.stokesleyscience.org/A%20level%20Physics/EM%20Waves/applications.htm

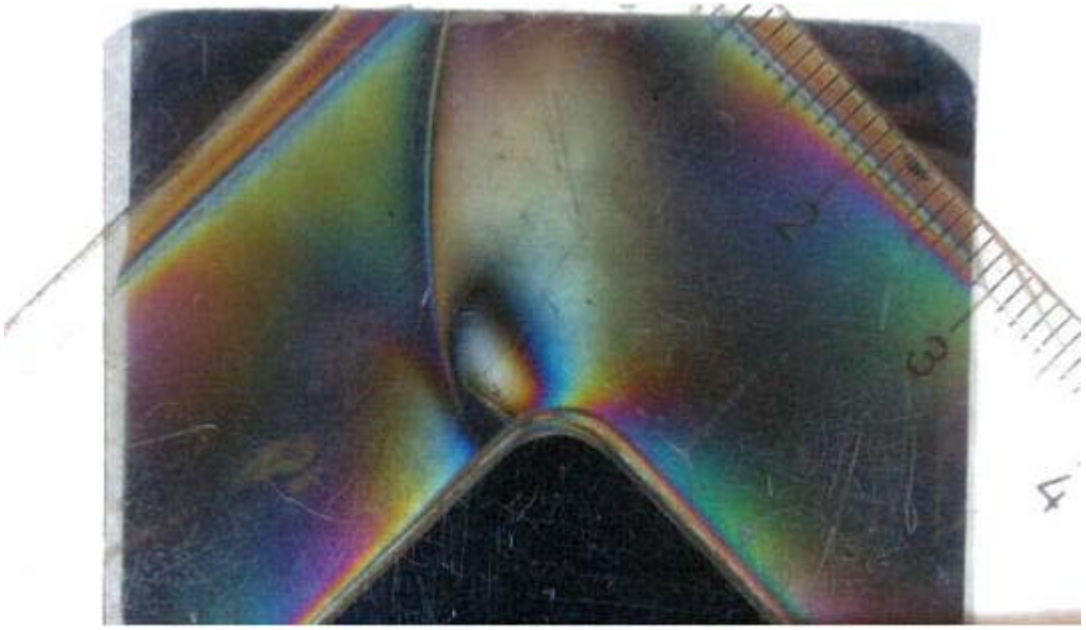
Ανάλυση Τάσεων με χρήση της Πόλωσης

Certain plastics rotate the plane of polarization of light passing through them. The angle through which the plane of polarization is rotated is found to vary when the sample is placed under stress, for example by bending it. The angle also depends on the wavelength of the light. The photograph on the right shows a small part of a plastic set square viewed under normal conditions



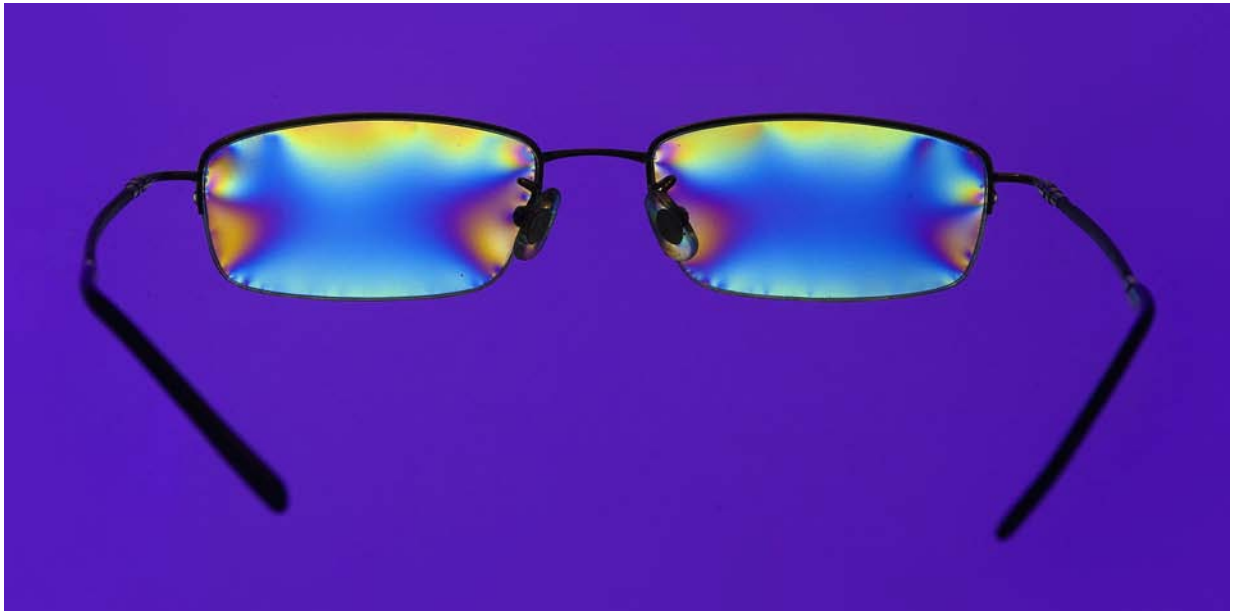
http://www.saburchill.com/physics/chapters2/0042.html

At places where the internal stresses are greatest, the colored bands change more rapidly (with distance). Engineers wishing to predict where a mechanical component might fail, when placed under stress, can make a model of the component out of, for example, Perspex and observe the “stress patterns” (the colored bands are more “concentrated” where the stresses are greatest. The design of the model can then be modified accordingly before the actual component is manufactured.



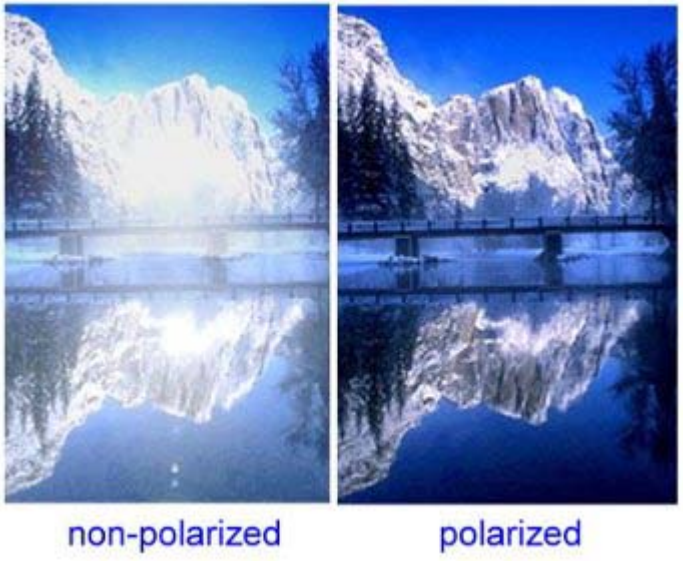
Ανάλυση Τάσεων με χρήση της Πόλωσης

Τάσεις σε Πλαστικά Γυαλιά

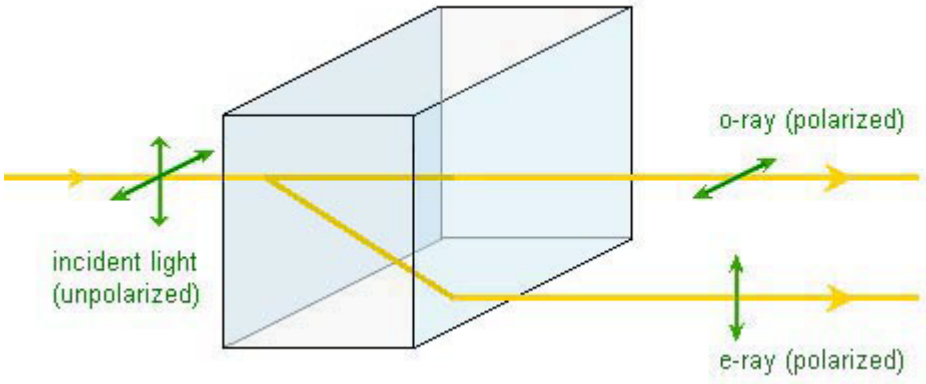


Πολωτικά Φίλτρα

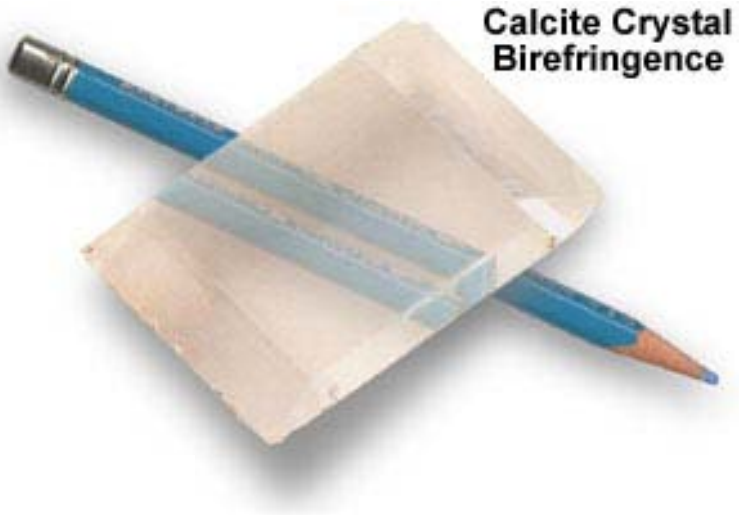
The effects of a polarizing filter (right image) on the sky in a photograph.



Διπλοθλαστικοί Κρύσταλλοι

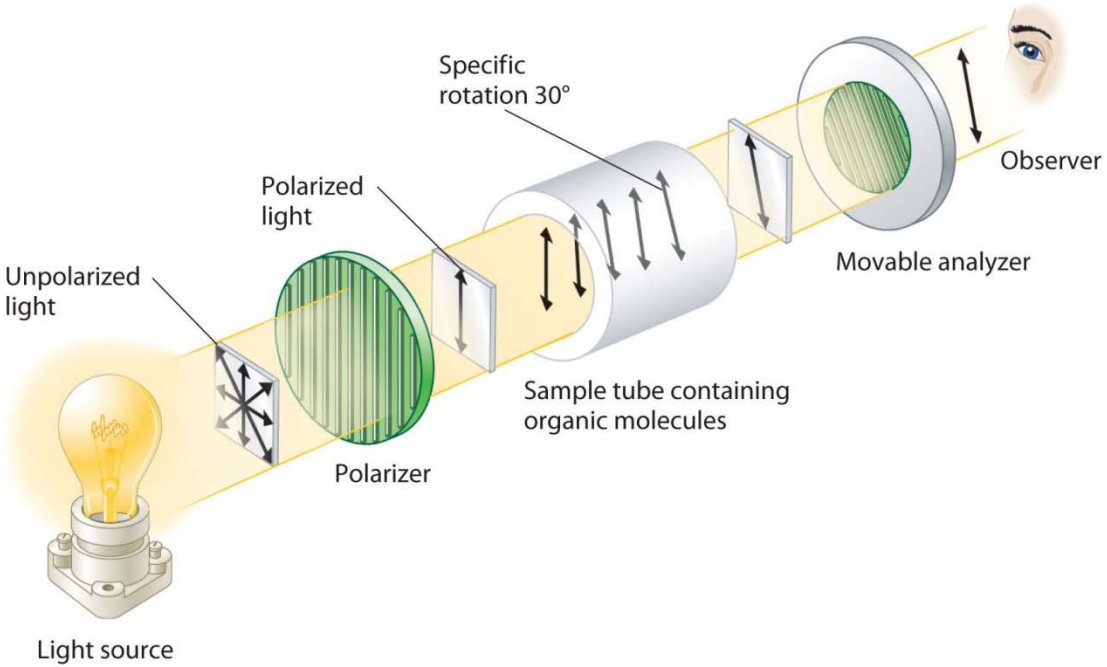


http://plc.cwru.edu/tutorial/enhanced/files/lc/biref/graphics/birefringence.JPG



http://www.olympusmicro.com/primer/images/birefringence/crystalpencil.jpg

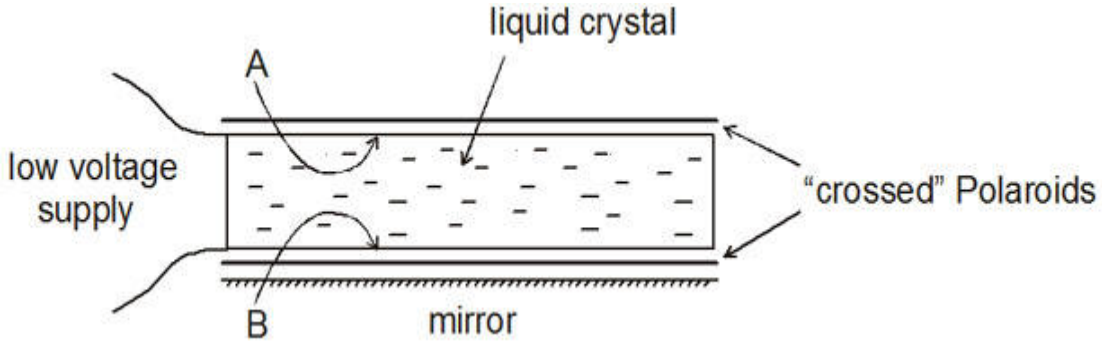
Μέτρηση Συγκέντρωσης Ουσιών σε Διαλύματα με χρήση της Περιστροφής της Πόλωσης

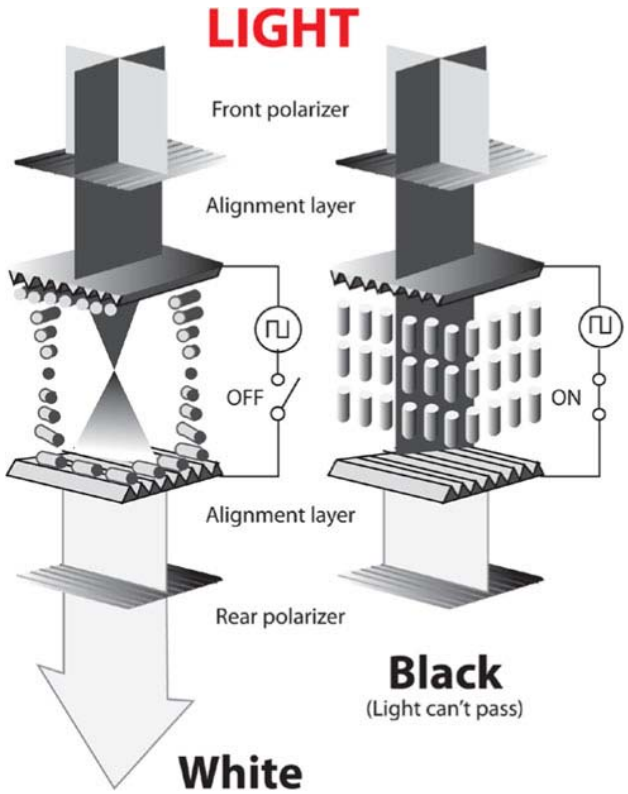


https://chem.libretexts.org/@api/deki/files/53868/a337ad5ab915a2785a17ae18073a40a9.jpg?revision=1

Certain solutions *rotate the plane of polarization* of light passing through them. The angle through which the plane of polarization is rotated depends on the concentration of the solution.

Οθόνες Υγρών Κρυστάλλων

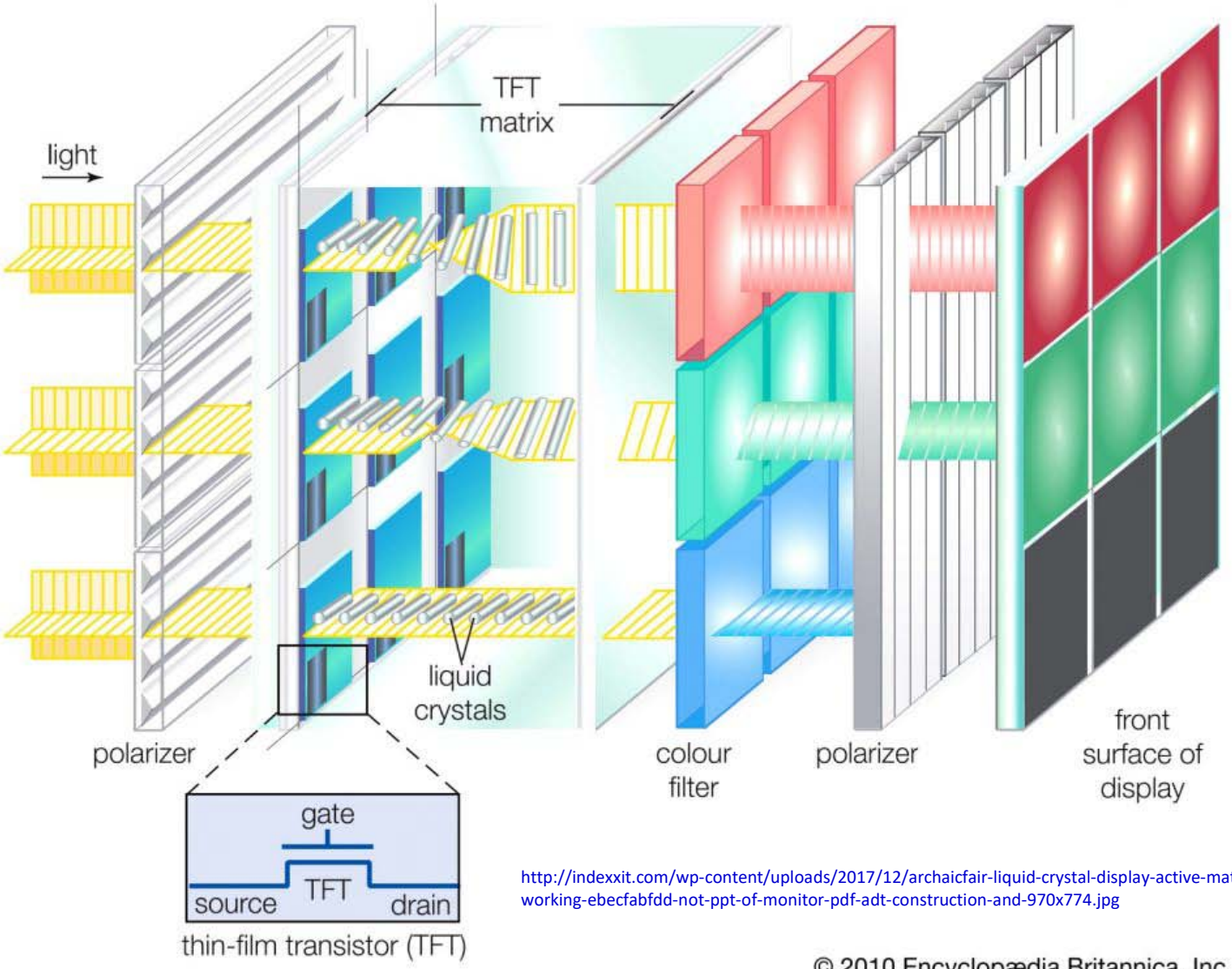




http://www.connessioni.biz/website/categoria-tecnologie/tecnologia-lcd-inorganici-guida-alla-tecnologia-parte-1.html?lang=en

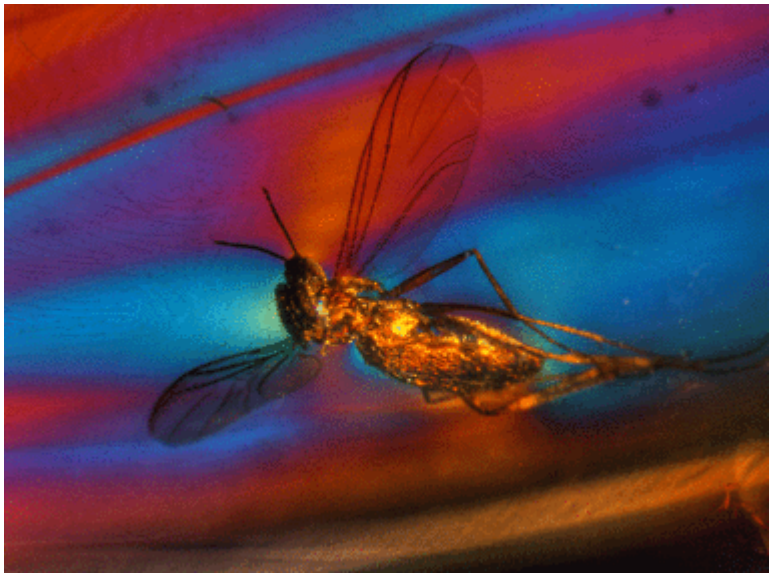
On the under-side of the top plate of the liquid crystal container, A, are fine lines etched parallel to the plane of polarization of the top Polaroid. Similarly there are lines etched into face B parallel to the plane of the lower Polaroid. The liquid crystals line up with these fine lines but also tend to line up with each other so there is a gradual change in the alignment of the crystals from A to B. The crystals *change the plane of polarization* of the light so that the light can pass through the lower polarizer and be reflected by the mirror. The display appears light. When a voltage is applied, the crystals line up along the direction of the electric field and they therefore no longer allow light to pass through. The display appears dark.

Οθόνες Υγρών Κρυστάλλων

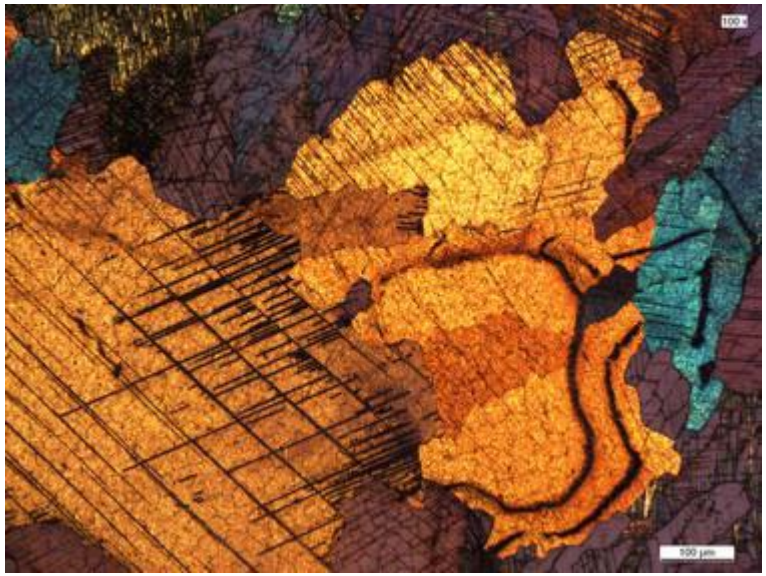


http://indexxit.com/wp-content/uploads/2017/12/archaicfair-liquid-crystal-display-active-matrix-working-ebecfabfdd-not-ppt-of-monitor-pdf-adt-construction-and-970x774.jpg

Πολωτική Μικροσκοπία



Inclusion of a fly in Baltic amber. Although amber is an amorphous substance and in theory optically isotropic, the flow structures of the resin due to internal strain as well as the strain caused by the inclusions can be visualized in polarized light. The use of polarized light and the first-order red compensator lead to intensive colors in the otherwise golden amber . Courtesy of Michael Hügi, Swiss Gemological Society, Bern, Switzerland.

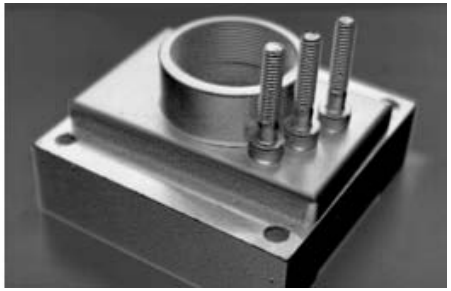


Cobalt, cold-rolled, Beraha etch, polarization. The examination of microstructure morphology plays a decisive role in materials science and failure analysis. Color contrast and specific microstructure formations can frequently be enhanced by optical polarization of the etched samples under the polarizing microscope. Courtesy of Ursula Christian, University of Pforzheim, Germany.

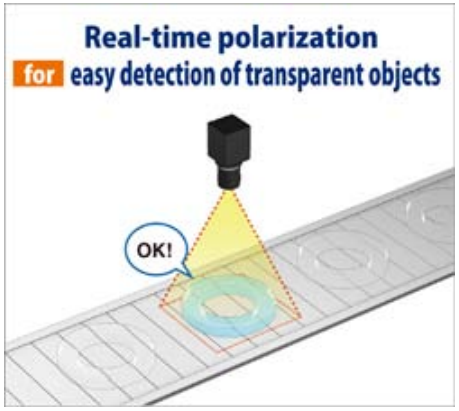
http://www.leica-microsystems.com/science-lab/polarization-contrast/

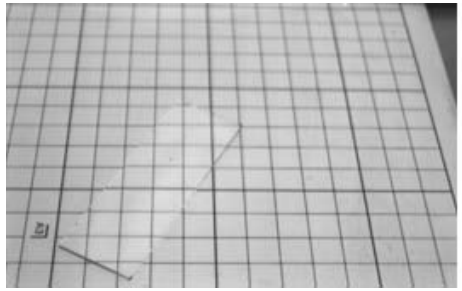
Πολωτική Φωτογραφική Μηχανή

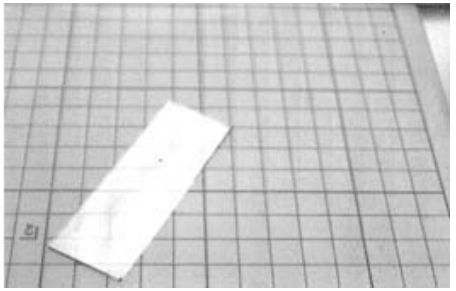
Μονόχρωμα Σκοτεινά Αντικείμενα



Διαφανή Αντικείμενα



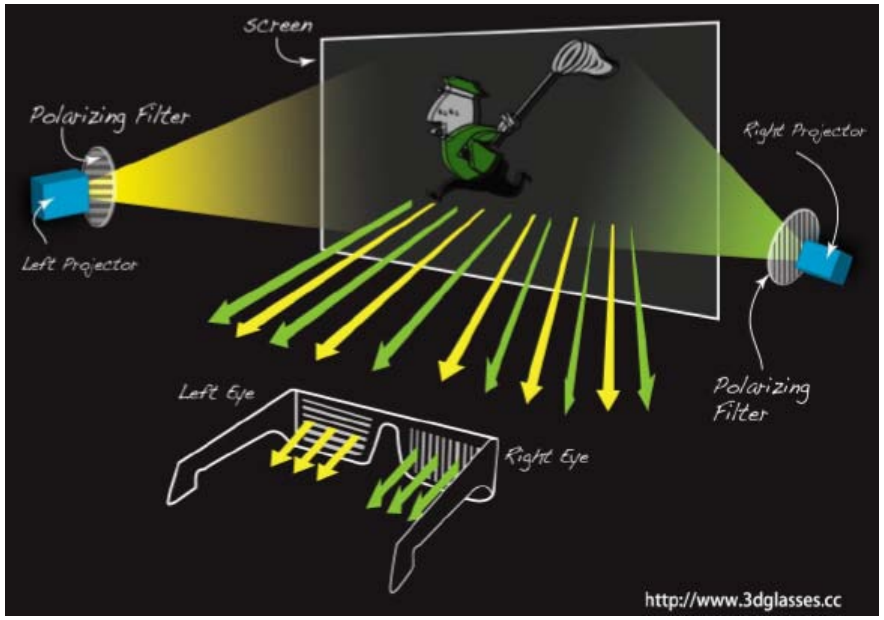


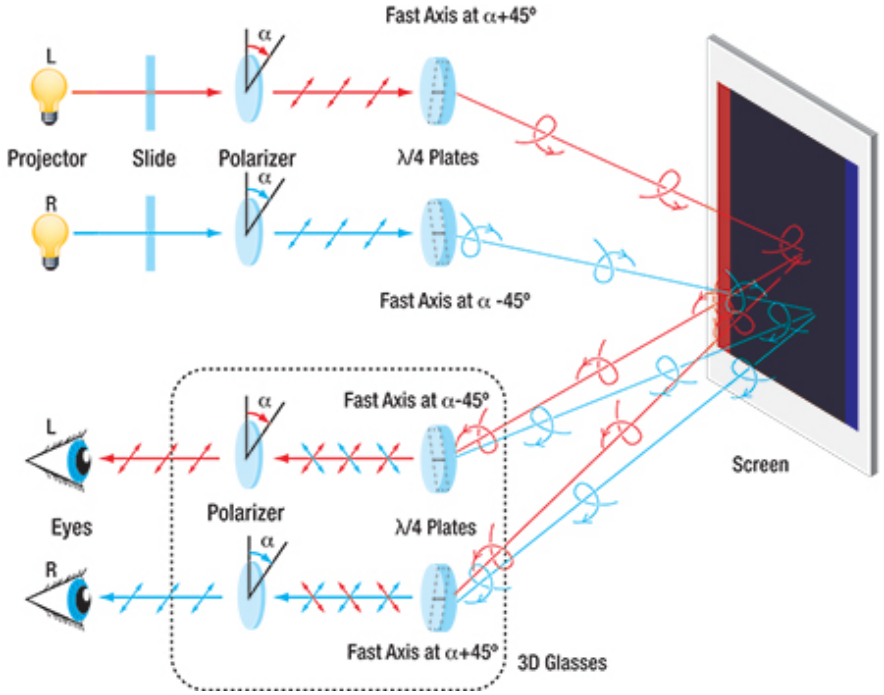


https://www.ricoh.com/technology/tech/051_polarization.html

3D Κινηματογράφος

https://i.kinja-img.com/gawker-media/image/upload/c_scale,fl_progressive,q_80,w_800/j3x9oiaqcnqub9twruqu.jpg

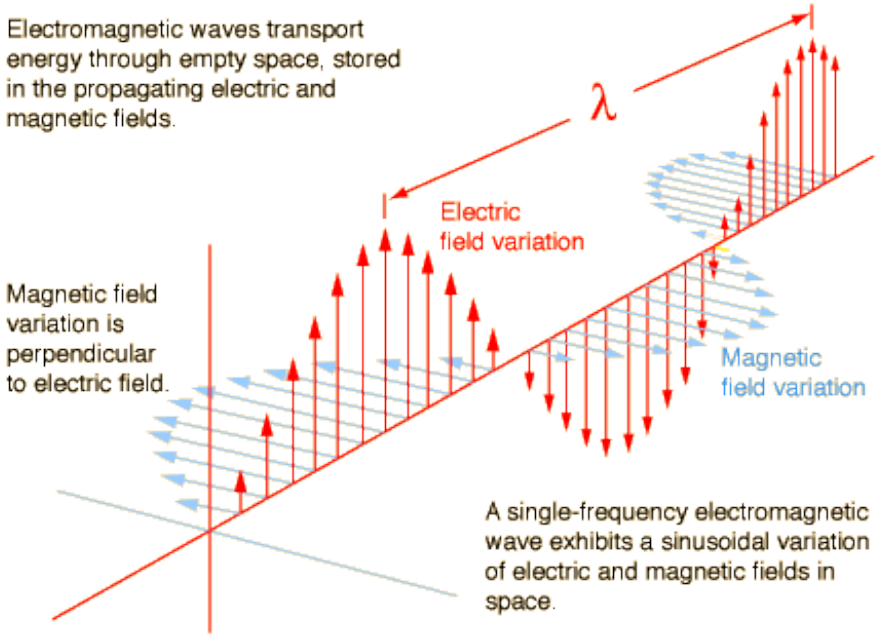




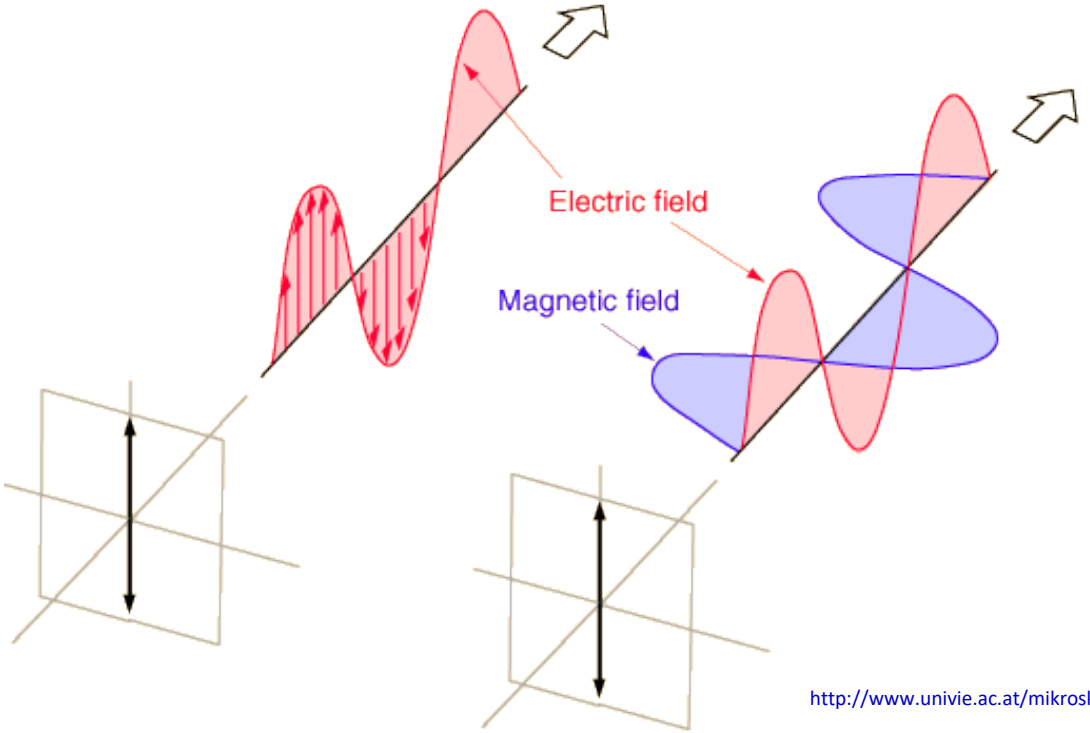
https://www.thorlabs.com/images/TabImages/3D_Cinema_A1-450.jpg

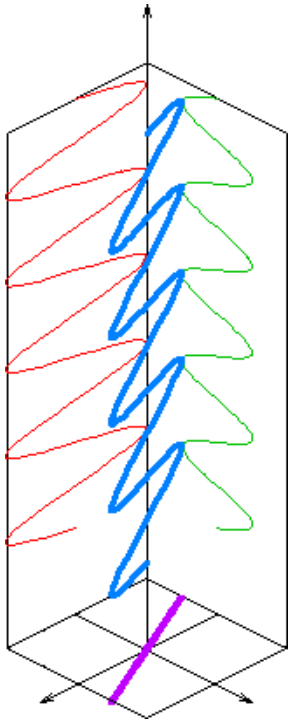
Πόλωση Ηλεκτρομαγνητικών Κυμάτων

- Το ηλεκτρικό πεδίο ταλαντώνεται κάθετα προς την διεύθυνση διάδοσης
- Η πόλωση του η/μ κύματος φανερώνει τον τρόπο ταλάντωσης



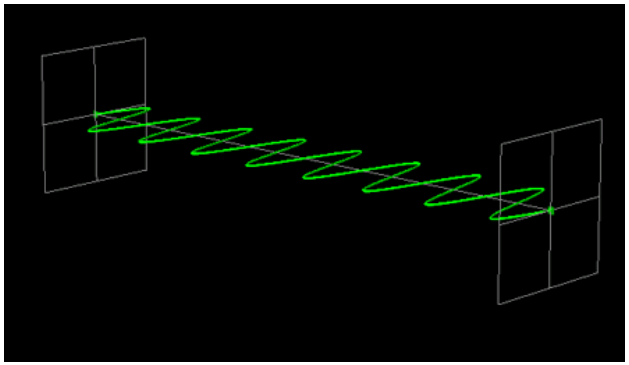
Γραμμική Πόλωση



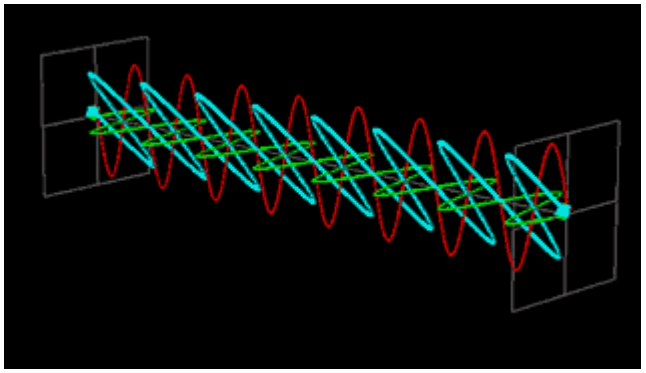


http://www.univie.ac.at/mikroskopie/1_grundlagen/optik/wellenoptik/6_polarisation.htm

http://hyperphysics.phy-astr.gsu.edu/hbase/phyopt/polclas.html

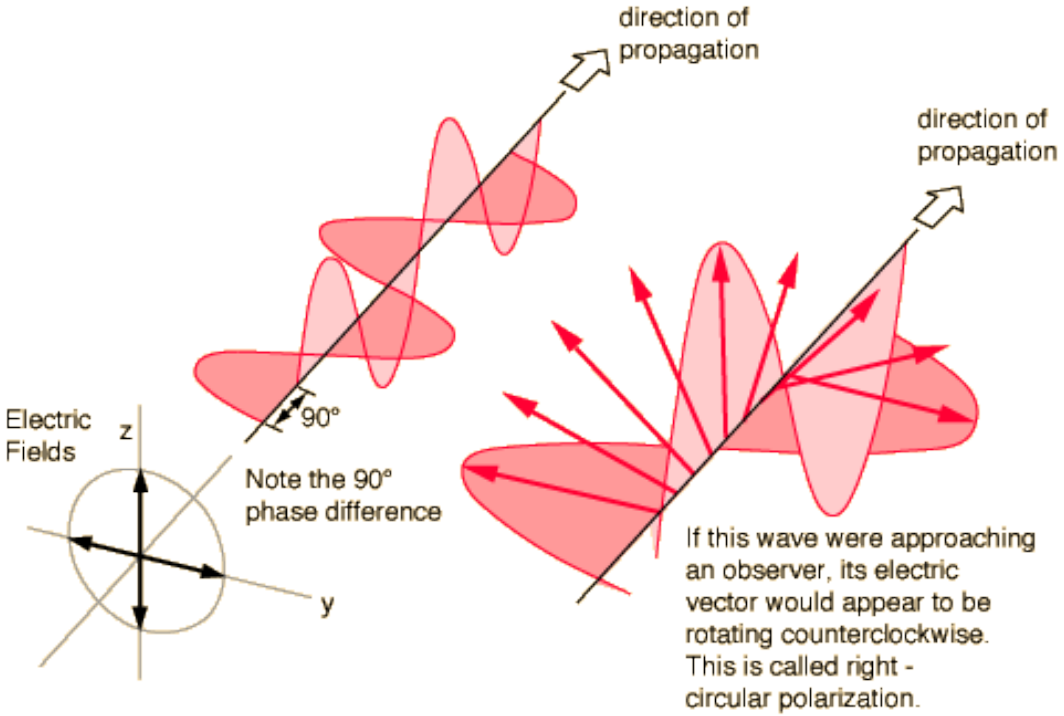


https://userscontent2.emaze.com/images/cac94365-b9dc-4762-9121-96c69882485b/458fc46b-b8bd-43e1-b3db-f7ae1667d4e0image20.gif

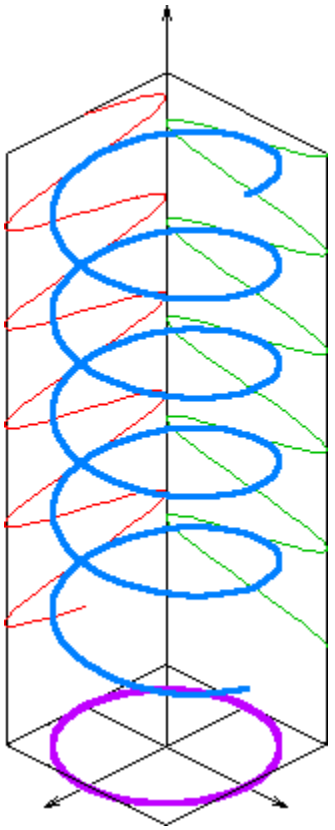


http://bestanimations.com/Science/Physics/45degree-polarized-light-wave.gif

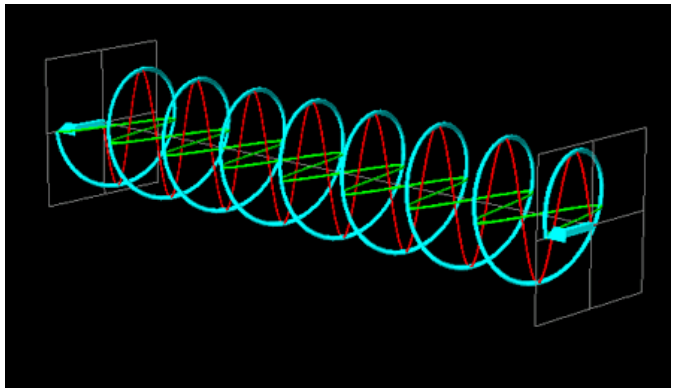
Κυκλική Πόλωση



http://hyperphysics.phy-astr.gsu.edu/hbase/phyopt/polclas.html

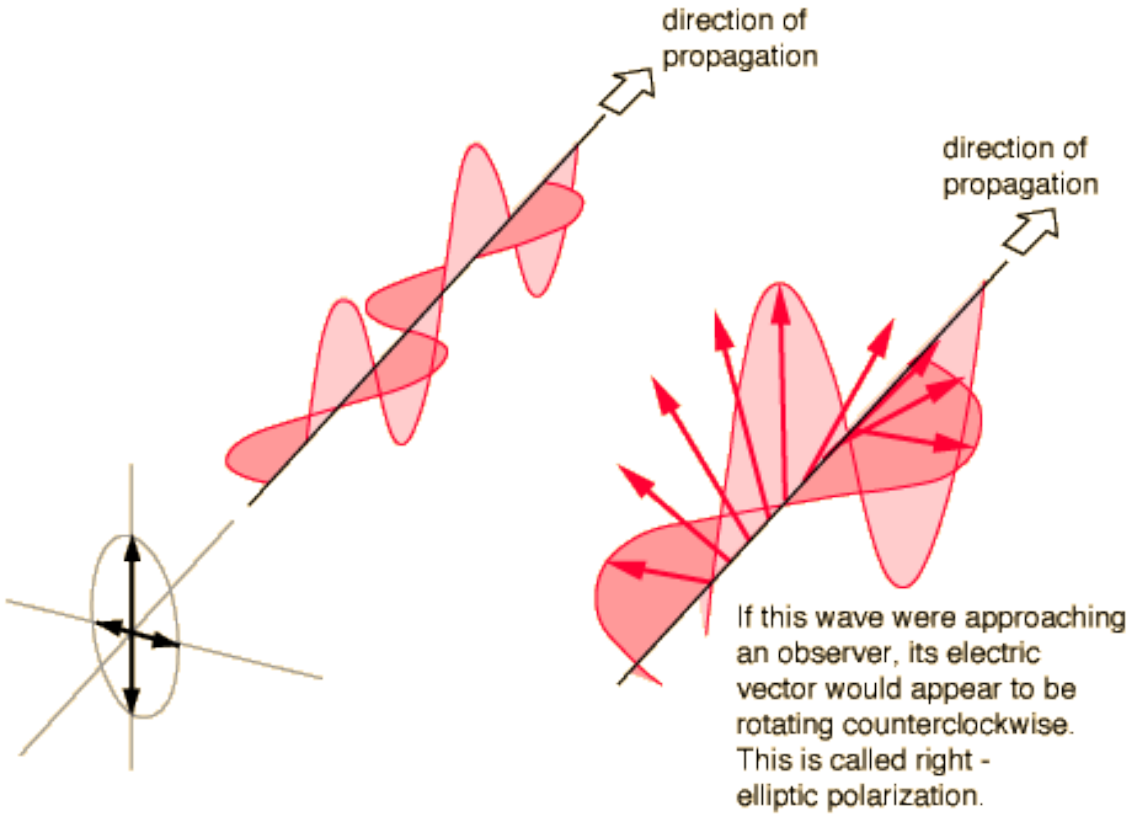


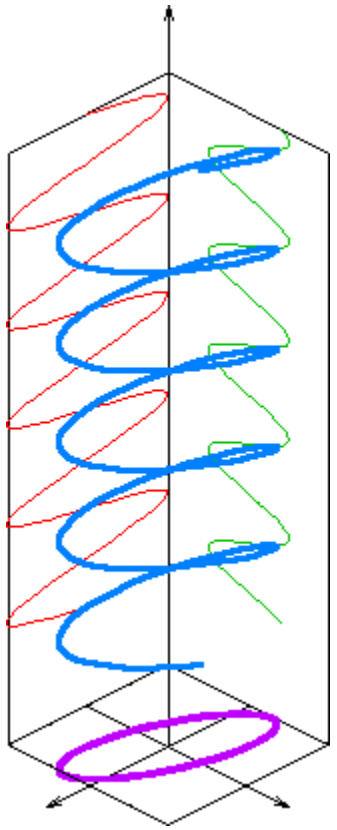
http://www.univie.ac.at/mikroskopie/1_grundlagen/optik/wellenoptik/6_polarisation.htm



http://i.imgur.com/3bjXjMd.gif

Ελλειπτική Πόλωση



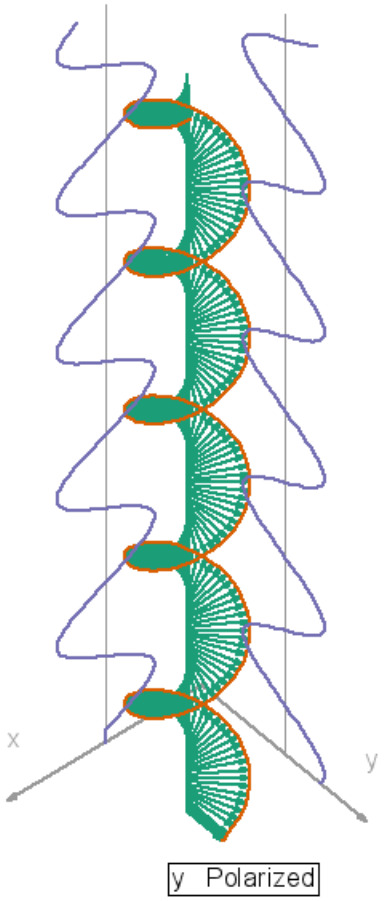


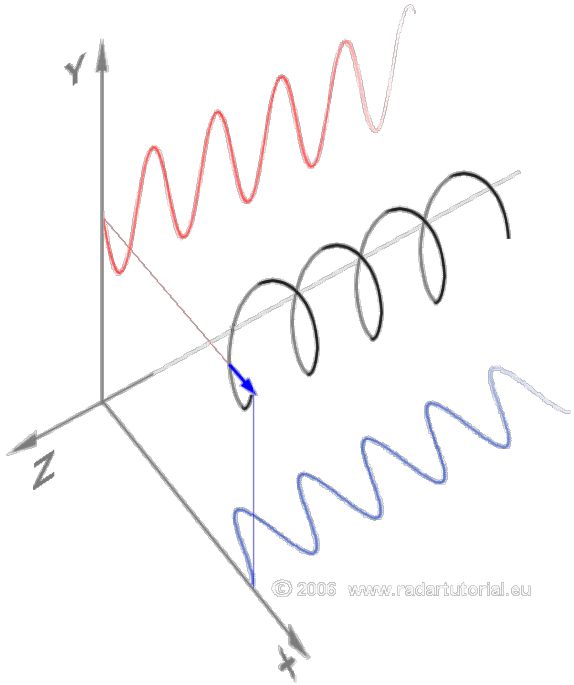
http://hyperphysics.phy-astr.gsu.edu/hbase/phyopt/polclas.html

http://www.univie.ac.at/mikroskopie/1_grundlagen/optik/wellenoptik/6_polarisation.htm

Πόλωση Ηλεκτρομαγνητικού Κύματος

(κινούμενη απεικόνιση με τον χρόνο)





Κυκλική Αριστερόστροφη Πόλωση

4 είδη πόλωσης η/μ κύματος.