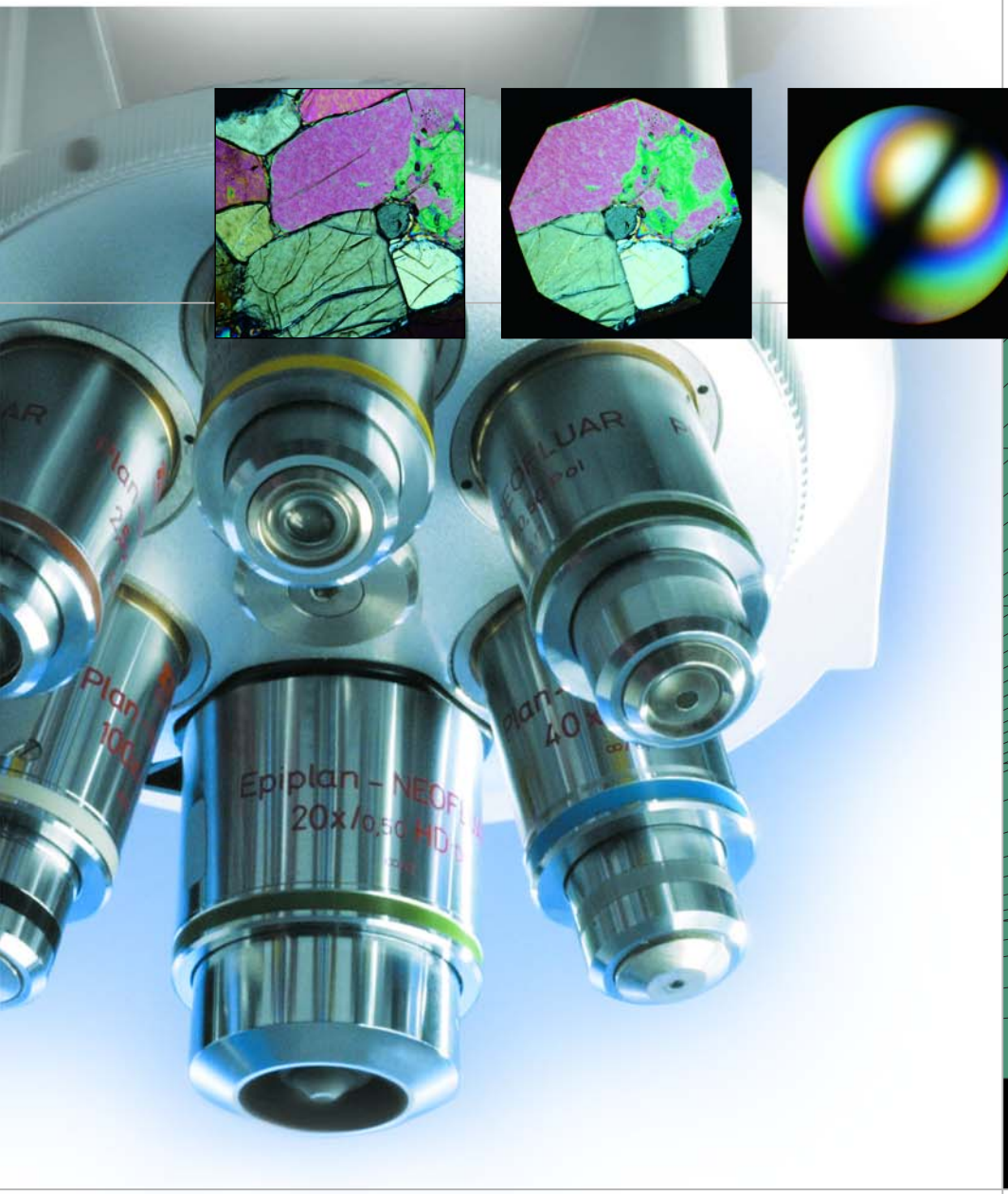
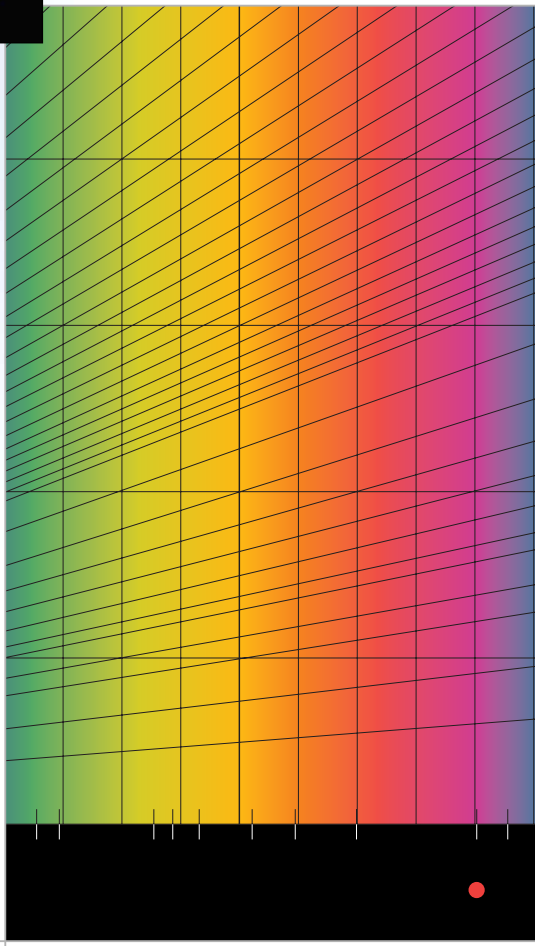
InfoForum

Michel Lévy Color Chart
Polarized Light
Conoscopic Determination





Information forum:

Polarization microscopy

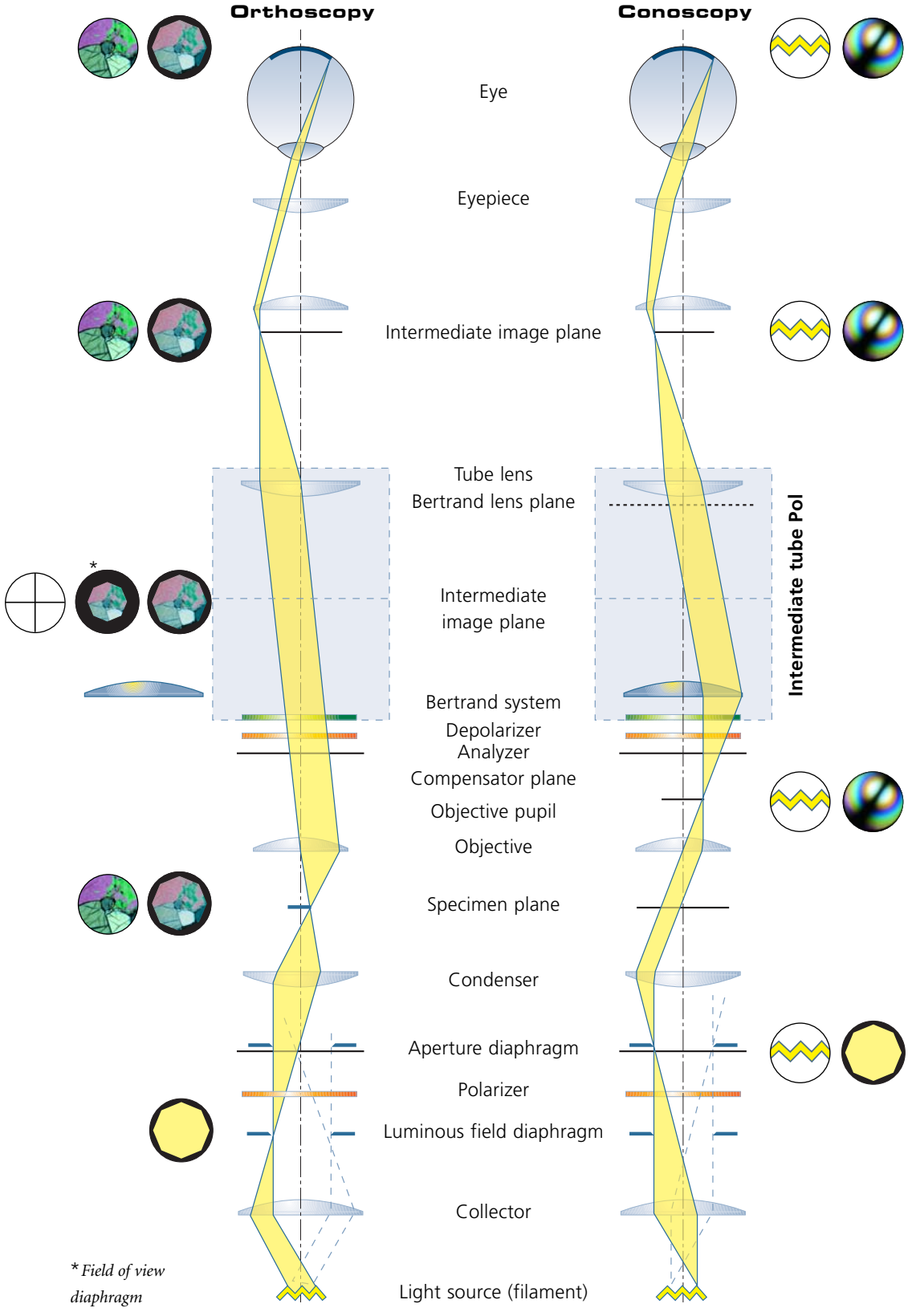
ZEISS

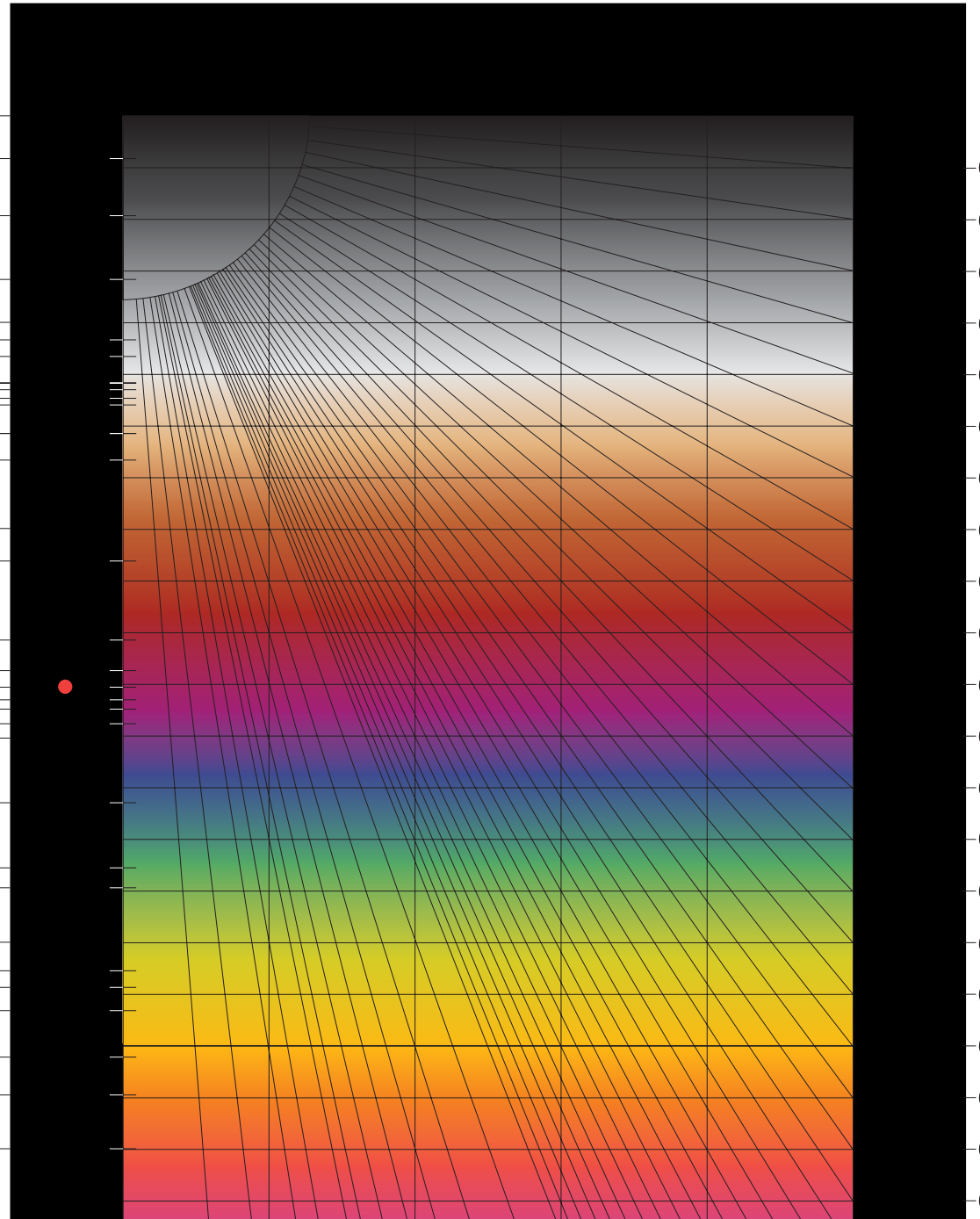
Polarization in transmitted light

Orthoscopy and conoscopy are the most important techniques in classical transmitted light polarization microscopy. With their different ways of examining, they provide different options, e.g. in mineral diagnosis in geological microscopy. In orthoscopy, each pixel corresponds to a dot in the specimen. Analyzing minerals is based on such morphological and optical features as form, cracks, color, pleochroisms, and their characteristic interference colors.

In conoscopy, each pixel corresponds to a direction in the specimen. This technique requires the use of the highest objective and condenser aperture possible. Particularly suitable objectives are CP-Achromat 50x/0.80 Pol, EC Plan-Neofluar 40x/0.9 Pol or EC Plan-Neofluar 100x/1.30 Oil Pol. When the Bertrand lens is placed in the light path, the interference or axial image in the back focal plane of the specimen becomes visible. Conoscopy is used when additional information about the specimen is necessary for analysis. It provides interference images that can be seen through the eyepiece and enable differentiation according to 1 or 2 axes and with compensator λ (λ-lamina, Red I), according to 1-axis positive/negative or 2-axis positive/negative.

The Phototube Pol is designed for high-performance conoscopy. Thanks to its additional intermediate image plane with suspended crosshair and field of view diaphragm, it permits the conoscopy of crystals larger than 10 µm.





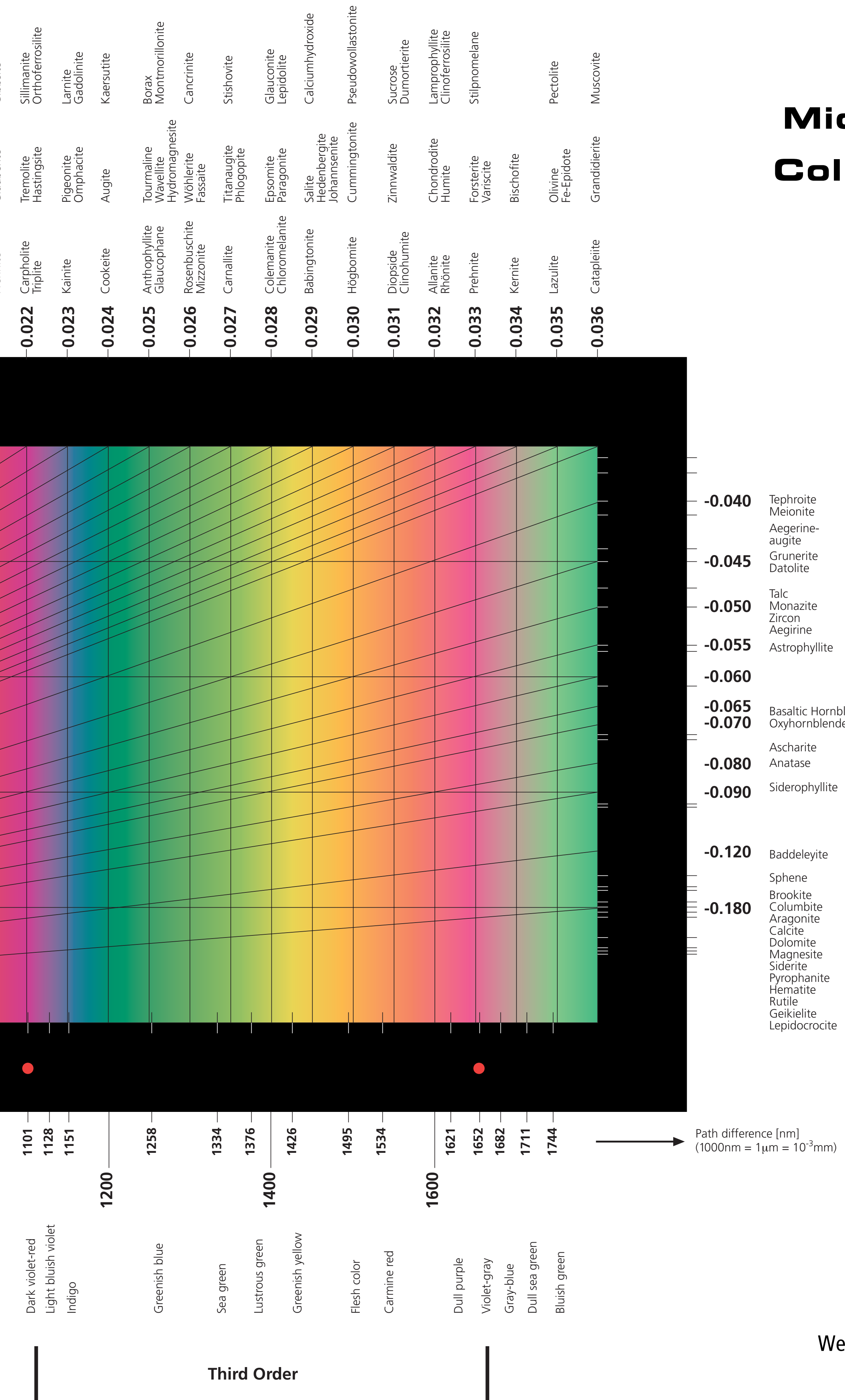
Black	0		
Iron gray	40		
Lavender gray	97		
Gray blue	158		
	200		
Clear gray	218		
Greenish white	234		
Nearly pure white	259		
Yellowish white	267		
Pale straw yellow	275		
Straw yellow	281		
Light yellow	306		
Bright yellow	332		
	400		
Brown-yellow	430		
Red-orange	505		
Red	536		
Deep red	551		
Purple	565		
Violet	575		
Indigo	589		
	600		
Sky blue	664		
Greenish blue	728		
Green	747		
	800		
Lighter green	826		
Yellowish green	843		
Greenish yellow	866		
Pure yellow	910		
Orange	948		
Bright orange-red	998		
	1000		

0.001	Pennine	Analcite Leucite	Cryolite Melilite
0.002	Ripidolite	Apophyllite Marialite	Saponite Halloysite
0.003	Phillipsite Kämmererite	Apatite Chabazite	β-Cristobalite α-Tricalciumphosphate
0.004	Riebeckite Chamosite	Eudialyte Vanthoffite	Vesuvianite Tridymite
0.005	Clinozoisite Arfvedsonite	Nepheline Sanidine	Serendibite Coesite
0.006	Heulandite Sapphirine Glaserite	Beryl Zoisite Harmotome	Orthoclase Microcline Åkermanite
0.007	Aenigmatite	Antigorite	Kaolinite
0.008	Chrysotile Triphylite	Corundum Plagioclase An 20-60	Silicocarnotite Anorthoclase
0.009	Topaz Enstatite Cordierite	Albite Celestite Struvite	Quartz Rankinite Tricalciumsilicate
0.010	Axinite Epistilbite Mg-Riebeckite	Stilbite Bronzite Chrysoberyl	Gypsum Boracite
0.011	Clinochlore Chloritoid	Andalusite Bytownite	Gehlenite Scolecite
0.012	Laumontite Hydronephelite Clintonite	Natrolite Barite Kornerupine	γ-Dicalciumsilicate Brushite Petalite
0.013	Dipyre Staurolite	Hypersthene Thenardite Margarite	Anorthite Rhodonite Trona
0.014	Eckermannite	Thuringite	Wollastonite
0.015	Epidote Picromerite	Jadeite Crossite	Bustamite Boehmite
0.016	Phenakite Merwinite	Monticellite Richterite	β-Dicalciumsilicate Mullite
0.017	Syngenite	Kyanite Na-Tremolite	Gedrite
0.018	Hiortdahlite		Thomsonite
0.019	Lawsonite Pumpellyite	Pargasite	Polyhalite Amesite
0.020	Melinophan Actinolite	Alunite Vermiculite Katophorite	Spodumene Amblygonite
0.021	Barkevikite Prehnite	Comm. Hornbl. Glauberite	Brucite Gibbsite

First Order

Second Order

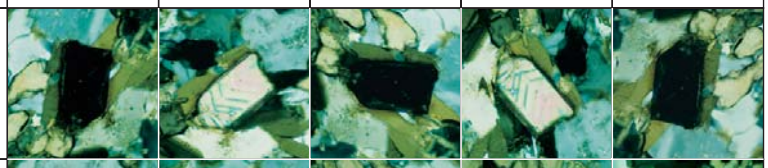
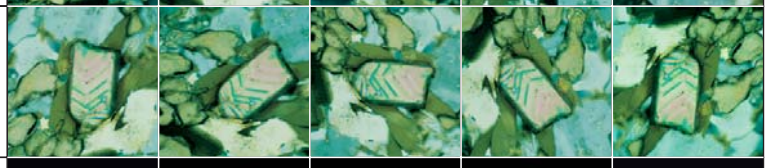
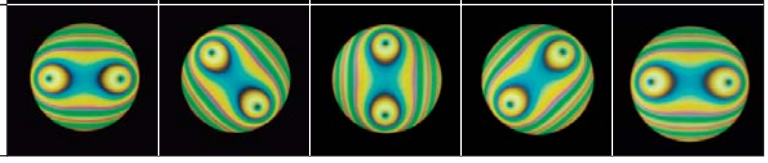
Michel Lévy Color Chart



Tephroite 0,038
Meionite 0,039
Tilleyite
Spurrite
Låvenite
Nontronite
Aegerine-augite
Biotite
Phengite 0,041
Grunerite
Datolite
Titanbiotite 0,043
Anhydrite 0,044
Carborundum 0,045
Talc
Pyrophyllite 0,047
Monazite
Diaspore
Fayalite 0,048
Zircon
Ilvaite 0,049
Aegirine
Cholesterole 0,050
Astrophyllite 0,052
Silk
Piemontite 0,055
Nylon 0,060
Basaltic Hornblende
Kieserite 0,063
Oxyhornblende
Cellulose 0,065
Ascharite 0,070
Anatase
Maltose 0,073
Siderophyllite
Stilpno melane 0,080
Bicalciumferrite
Brownmillerite 0,090
Glucose
Cassiterite 0,096
Baddeleyite
Xenotime 0,107
Sphene
Carbamide 0,120
Brookite
Goethite 0,140
Columbite
Monocalciumferrite 0,150
Aragonite
Whewellite 0,156
Calcite
Ludwigite 0,172
Dolomite 0,180
Magnesite 0,195
Siderite 0,241
Pyrophanite 0,270
Hematite 0,280
Rutile 0,286
Geikielite 0,36
Lepidocrocite 0,57

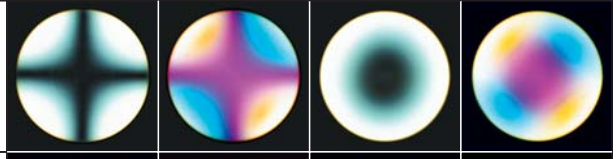
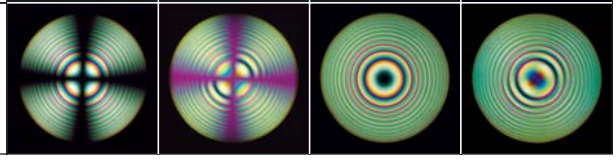
We make it visible.

Linear and circular polarized light

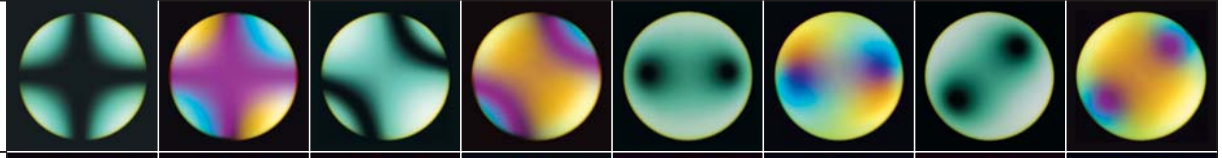
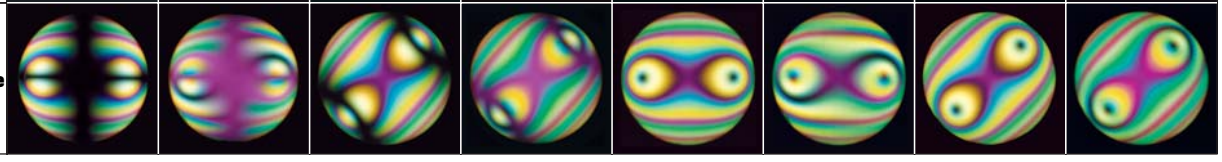
Specimen		State of polarization of the light	Rotation of the microscope stage 0°	45°	90°	135°	180°
Zircon		linear					
		circular					
Muscovite		linear					
		circular					

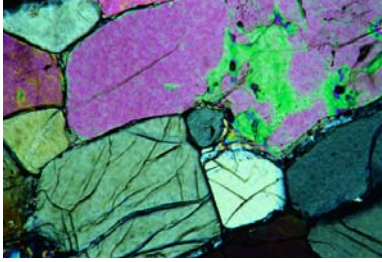
Behavior of optically anisotropic crystals in linearly and circularly polarized light in orthoscopic and conoscopic observation.

Determination of optical character

uniaxial	State of polarization of the light			
	linear		circular	
	compensator λ			
	without	with	without	with
positive quartz				
negative calcite				

Determination of the optical character of uniaxial and biaxial minerals in linearly and circularly polarized light. The reference direction n_y of the λ-compensators is oriented NE-SW.

biaxial	State of polarization of the light							
	linear				circular			
	compensator λ							
	without	with	without	with	without	with	without	with
	normal position		diagonal position		normal position		diagonal position	
positive barite								
negative muskovite								



Dunite thin section, transmitted light polarization

Polarization microscopy from Carl Zeiss

Polarization microscopy from Carl Zeiss is based on Axioskop 40 Pol and Axio Imager for Polarization microscopy. Two powerful microscopes that are tailor-made for your individual applications and designed to meet the growing needs of polarization microscopy – easier and more effectively than ever before.

	Stands	Tubes	Reflector turrets	Nosepieces	Polarizers	Analyzers	Bertrand system
Axioskop 40 A Pol	Transmitted light (basic version)	Binocular tube 30°/23 or binocular tube with photoport 20°/20 Pol or ergotube 20°/23 and other tubes if desired		6 position H	All polarizers except Circular Polarizer	Analyzer slider	Diopter or auxiliary microscope
Axioskop 40 Pol	Transmitted light		5 position, change of Push&Click module without tools	6 position Pol (5xW 0.8 screw thread, 1xM27 screw thread for HD DIC objective), individually centerable	**Transmitted light:** Polarizer (switchable), polarizer (rotatable with 0° and 90° stop), polarizer (switchable with λ-plate, rotatable), Circular Polarizer **Reflected light:** Reflector module Pol, reflector module Pol for HBO 103	Analyzer module or measurement analyzer with 0.1° splitting, 180° rotatable	Fixed focus Betrand module and switchable pin hole diaphragm or intermediate tube Pol with focusable Bertrand lens; crosshair and field of view diaphragm in additional intermediate image planes
	Transmitted and reflected light						
Axio Imager for Polarization microscopy	Transmitted light	Phototube Pol and further tubes from the Axio Imager program if desired	6 position, manual, encoded, motorized or with automatic component recognition, change of Push&Click module without tools	6 position Pol, encoded (6xM27 screw thread, 1 screw thread for DIC slider exposure), individually centerable	**Transmitted light:** Polarizer (switchable), polarizer (rotatable with 0° and 90° stop), polarizer (switchable with λ-plate, rotatable), Circular Polarizer **Reflected light:** Reflector module Pol, measurement polarizer with 0.1° splitting, 360° rotatable	Analyzer module or analyzer slider or analyzer slider with analyzer and λ-plate, 360° rotatable or measurement analyzer with 0.1° splitting, 360° rotatable	Phototube Pol with focusable Bertrand lens; crosshair and field of view diaphragm in additional intermediate image plane
	Transmitted and reflected light						
	Reflected light						

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