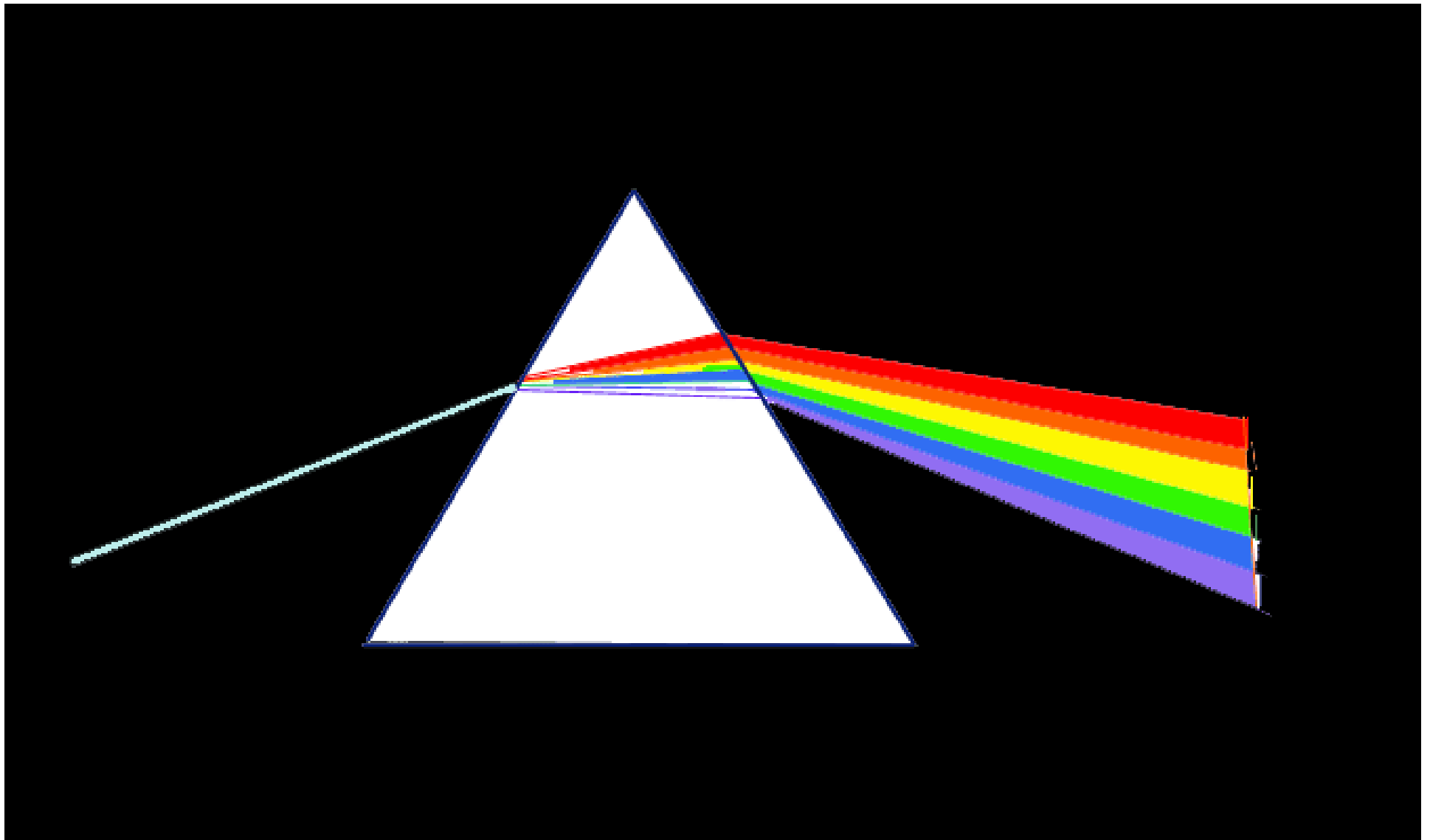


# *Light in Minerals II*

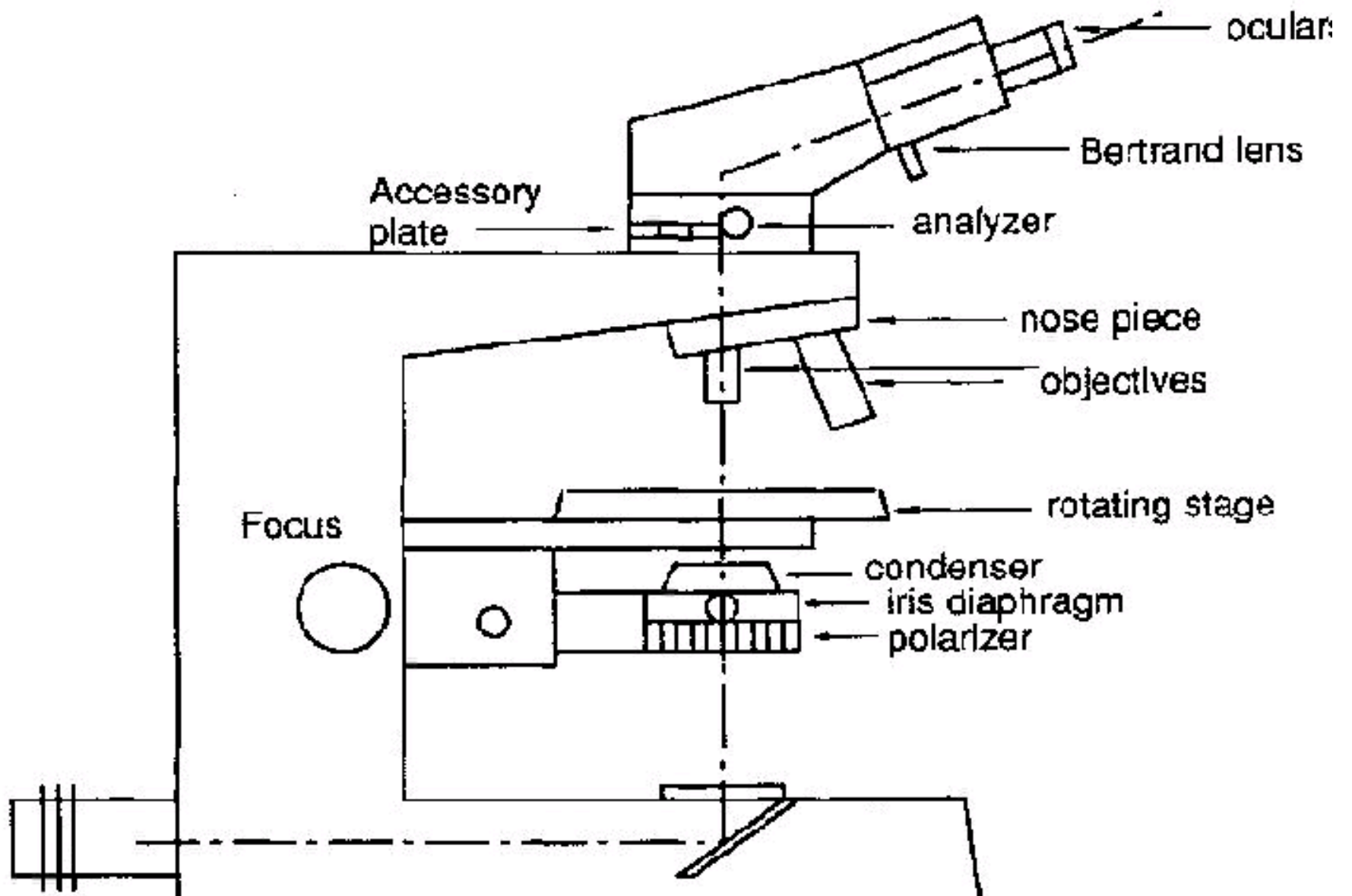


# *Light in Minerals*

- Polarization: Vibration directions
- The Petrographic Microscope
- Measuring Index of Refraction
- Pleochroism
- Birefringence: Optical anisotropy
- The Indicatrix:
- Uniaxial Minerals
- Biaxial Minerals

# Petrographic Microscope

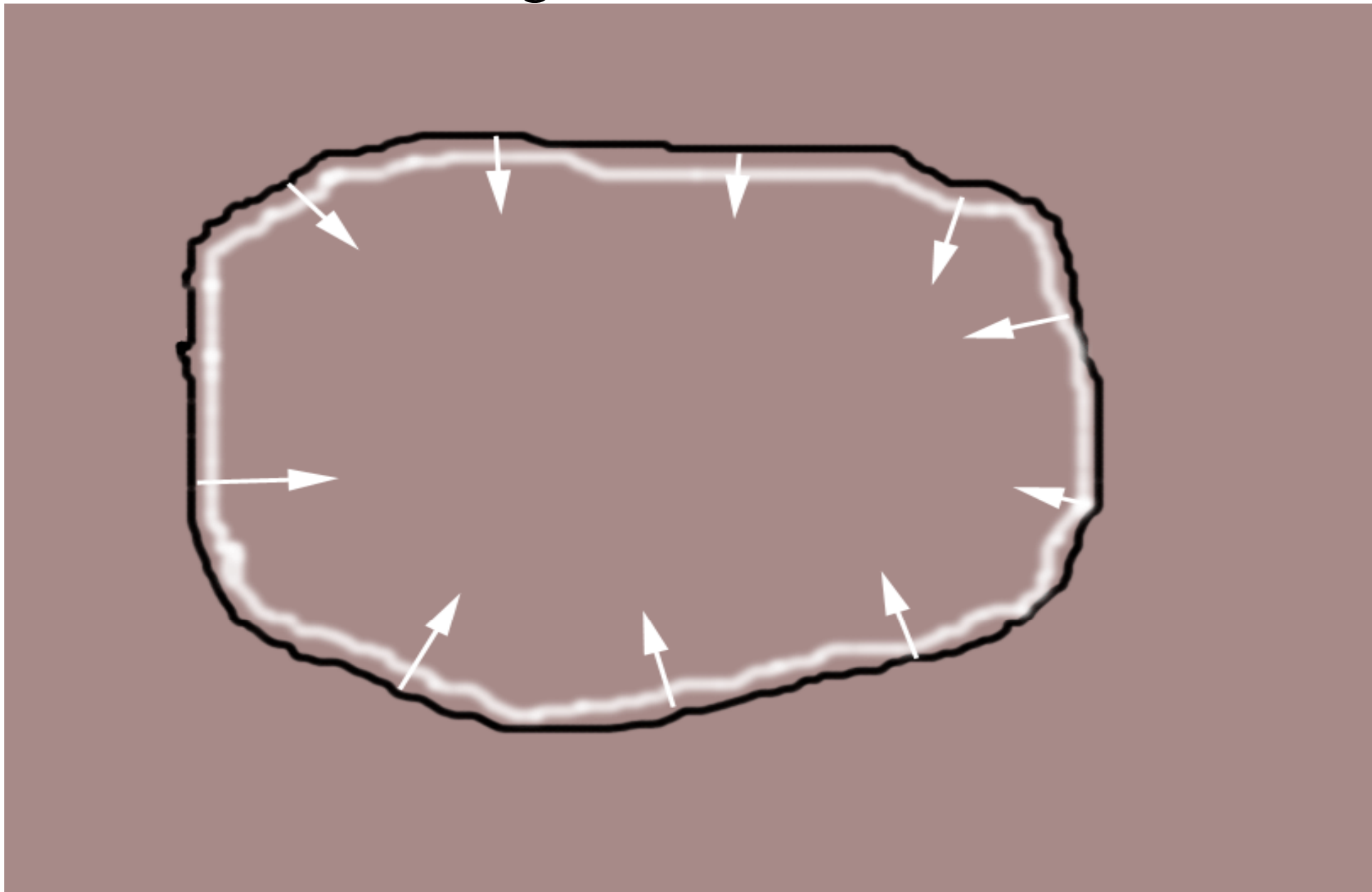




# *Becke Line Method*

- As you increase the working distance, the white line moves to the medium of higher index.
- If dispersion curves cross, liquid has higher slope and yellow moves in and blue moves out.

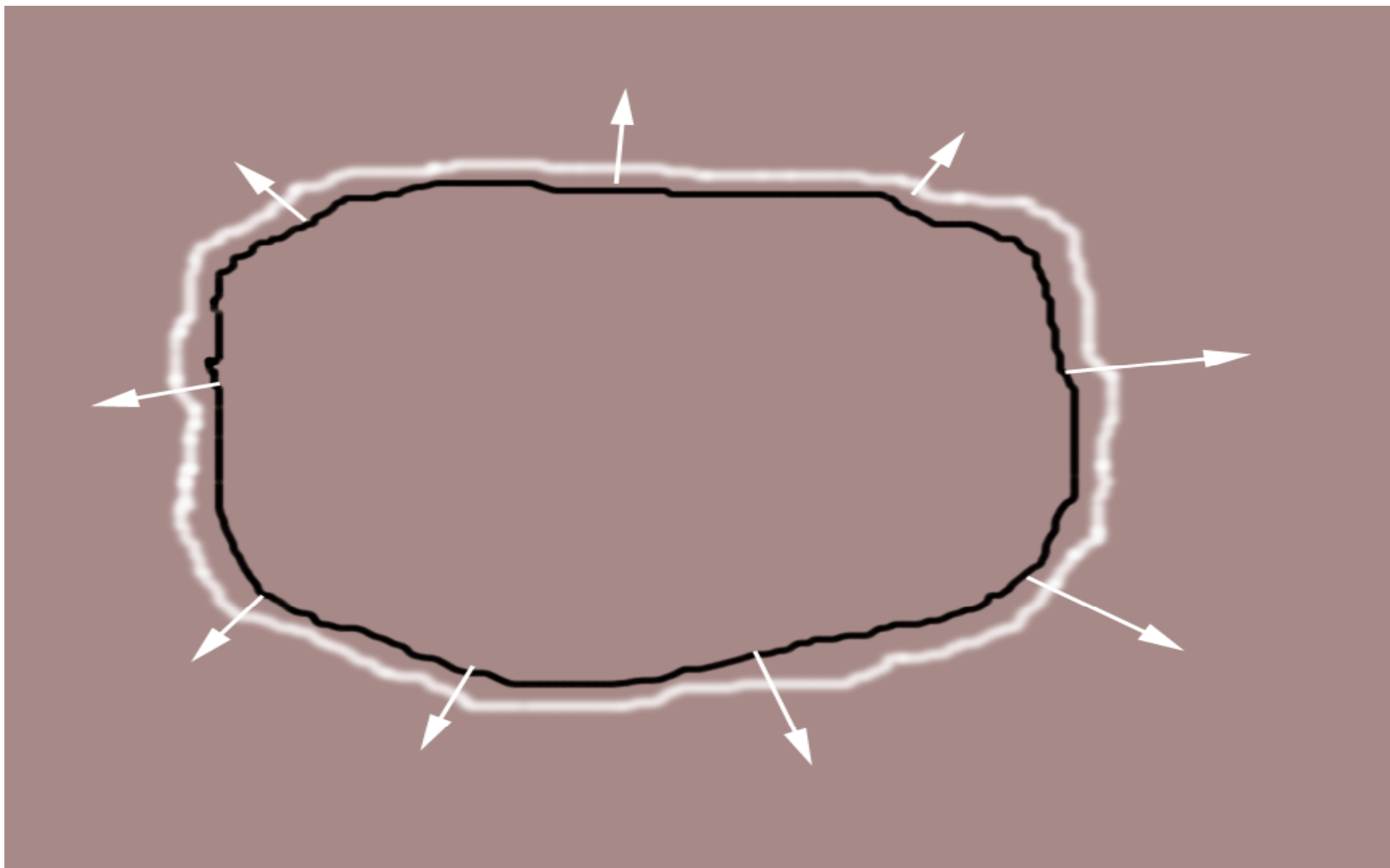
$$l_{\text{grain}} > l_{\text{oil}}$$



$$I_{\text{grain}} > I_{\text{oil}}$$

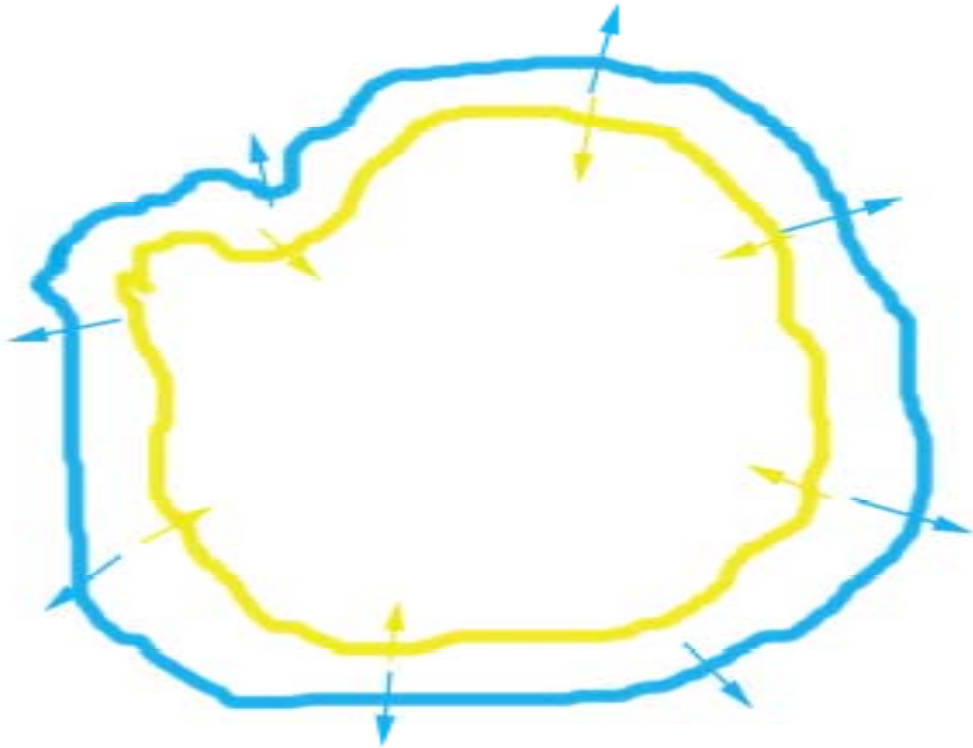


$$l_{\text{grain}} < l_{\text{oil}}$$



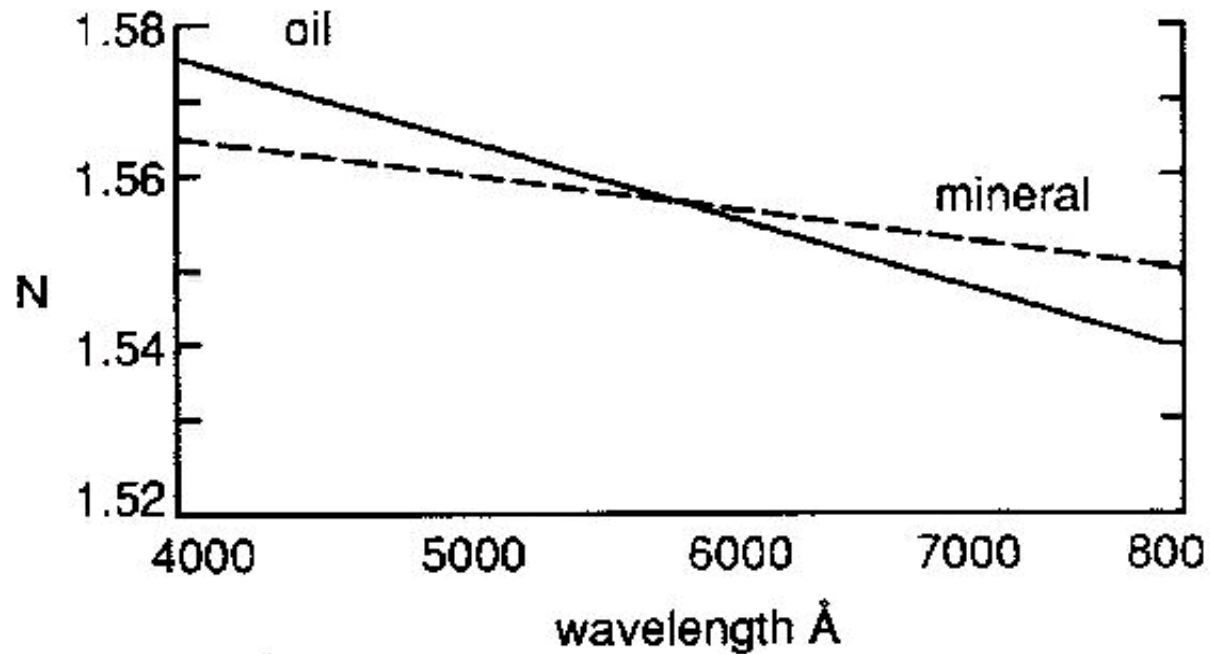


$$l_{\text{grain}} = l_{\text{oil}}$$



# Dispersion

- The index of refraction (velocity) varies with wavelength.



# *Optical Anisotropy*

- **Pleochroism:**

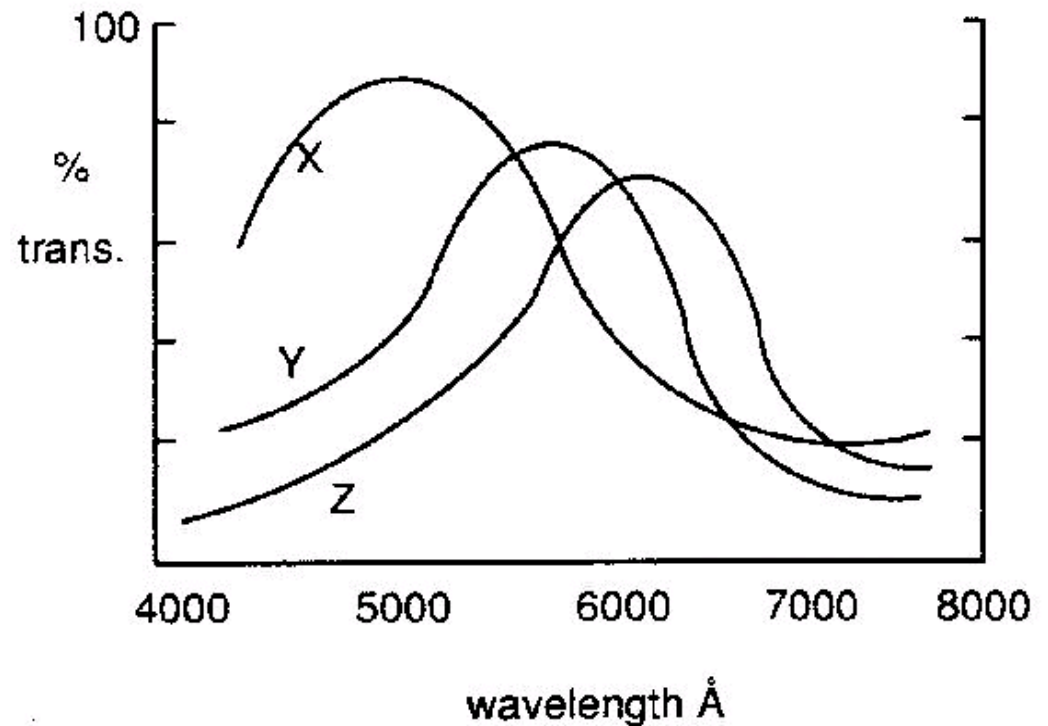
- Different absorption for light **vibrating** in different directions.
- Mineral grains change color on rotation in **plane-polarized light**.

- **Birefringence:**

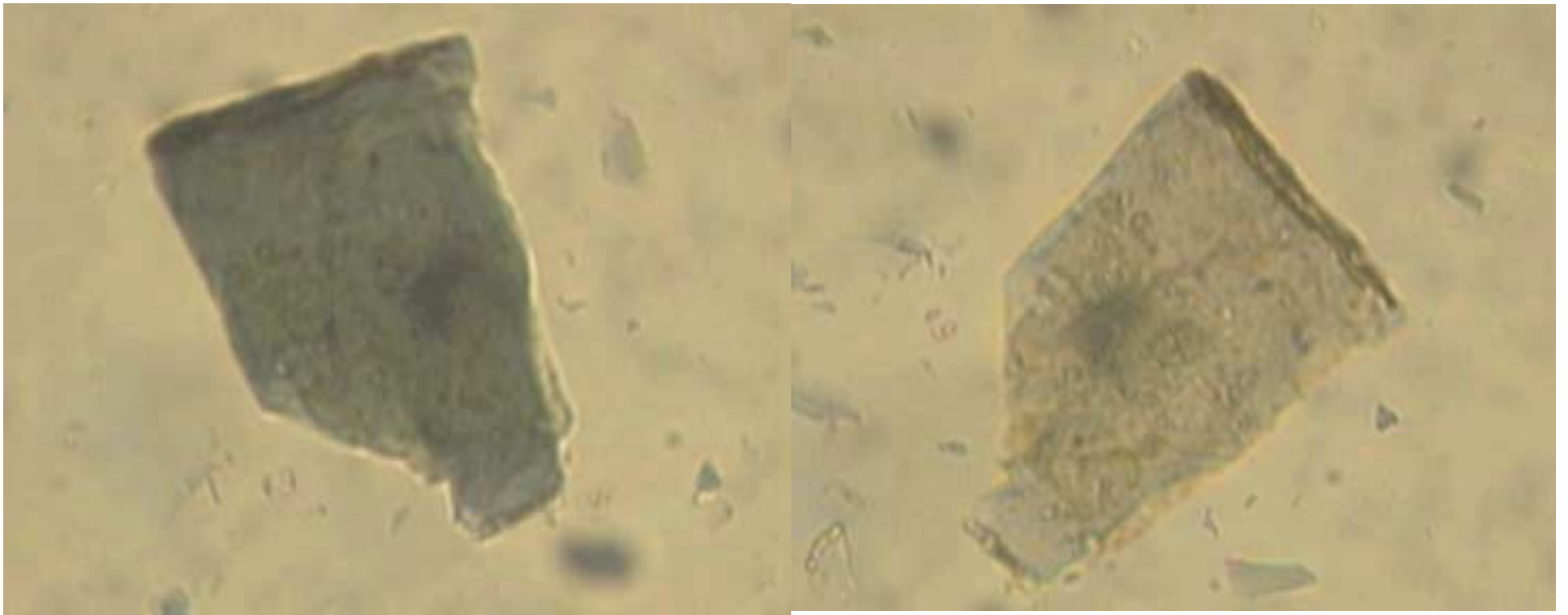
- Different velocities (index or refraction) for light **vibrating** in different directions.
- Mineral grains change color on rotation **between crossed polarizers**

# *Pleochroism*

- Pleochroism is different absorption spectra for light vibrating in different directions
- Pleochroism is observed non-cubic Fe-bearing minerals



*Pleochroism:  
Tourmaline in PPL*



# *Birefringence*