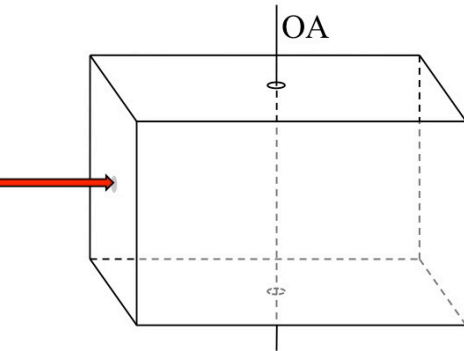


3. [8 points] Unpolarized light is incident on a block of birefringent material, with the optic axis (OA) oriented as shown in the diagrams below.

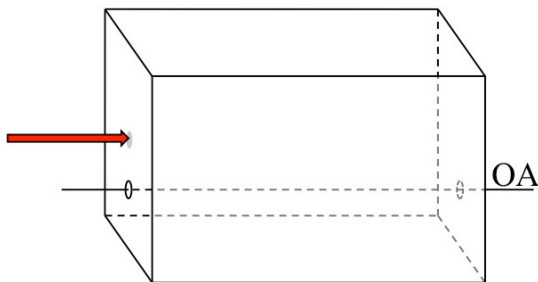


a)

i. A single refracted ray. Unpolarized light can be modeled as a random mix of 2 orthogonal polarization states. However, this interface does not split any different states into any different directions, so there is only one refracted ray, and it remains unpolarized. In other words, the different polarization states remain unobserved and unrealized, and at random phases relative to one another.

ii. N/A the light is unpolarized.

iii. No.

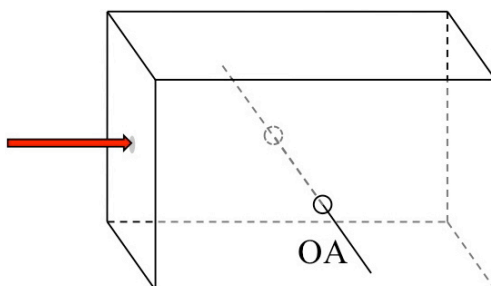


b)

i. A single refracted ray.

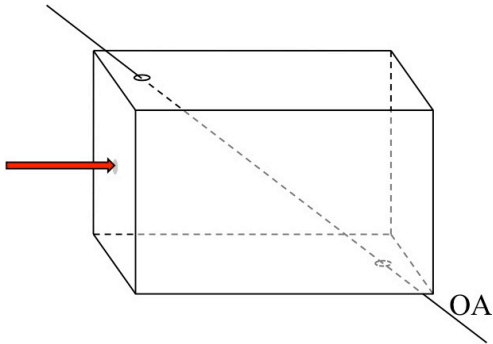
ii. N/A the light is unpolarized.

iii. No.



c) (Optic Axis emerging normal to front surface of the block)

- i. A single refracted ray. Unpolarized light can be modeled as a random mix of 2 orthogonal polarization states. However, this interface does not split any different states into any different directions, so there is only one refracted ray, and it remains unpolarized. In other words, the different polarization states remain unobserved and unrealized, and at random phases relative to one another.
- ii. N/A the light is unpolarized.
- iii. No.



d)

- i. Double refraction.
- ii. yes one ray will be phase retarded relative to the other.
- iii. Both rays will be linearly polarized and orthogonal to each other.