

Ray tracing and generation of entangled light

Part A. Light propagation in isotropic dielectric media

A.1 (0.4 pt)

$$v_p =$$

A.2 (0.2 pt)

$$n =$$

A.3 (0.4 pt)

$$\hat{S} =$$

$$v_r =$$

Part B. Light propagation in uniaxial dielectric media

B.1 (1.5 pt)

Allowed refractive indices and corresponding \hat{B} and \hat{D} for a given θ :

Set 1

$$n =$$

$$\hat{B} =$$

$$\hat{D} =$$

Set 2

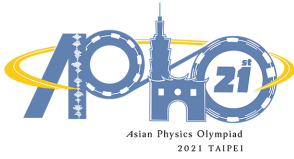
$$n =$$

$$\hat{B} =$$

$$\hat{D} =$$

The angle with only one value of refractive index is permitted

$$\theta =$$



B.2 (0.8 pt)

Set 1

Polarization $\hat{E} =$

Which wave (ordinary or extraordinary):

$\tan \alpha =$

Set 2

Polarization $\hat{E} =$

Which wave (ordinary or extraordinary):

$\tan \alpha =$

B.3 (0.6 pt)

Set 1

Refractive index $n =$

Polarization $\hat{E} =$

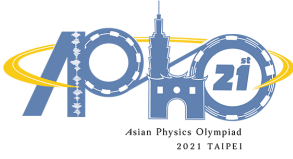
Which wave (ordinary or extraordinary):

Set 2

Refractive index $n =$

Polarization $\hat{E} =$

Which wave (ordinary or extraordinary):



B.4 (0.8 pt)

Set 1

$$\tan \alpha_r =$$

$$v_r =$$

$$\hat{S} =$$

Set 2

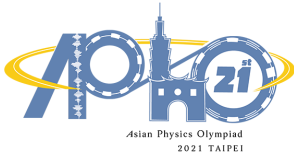
$$\tan \alpha_r =$$

$$v_r =$$

$$\hat{S} =$$

$$n_s =$$

(in terms of \hat{S} , \hat{x} , \hat{z} , n_o , and n_e)



B.5 (1.1 pt)

$\vec{A} =$

$\vec{B} =$

$\vec{C} =$

$\tan \theta_2 =$ $(\phi = 0)$

$\tan \theta_2 =$ $(\phi = \frac{\pi}{2})$

Part C. Entanglement of light

C.1 (0.8 pt)

All possible relations between $\omega, \omega_1, \omega_2$ and $\vec{k}, \vec{k}_1, \vec{k}_2$

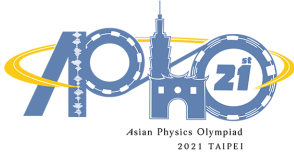
Relation 1:

which conservation laws:

Relation 2:

Which conservation laws:

Equations for splitting ω and \vec{k} into ω_1, ω_2 and \vec{k}_1, \vec{k}_2 :



C.2 (0.8 pt)

Impossible ways of splitting:

C.3 (1.3 pt)

$M =$

$N =$

$L =$

Angle between the axis of the cone and z' axis:

Angle of the cone:

C.4 (0.8 pt)

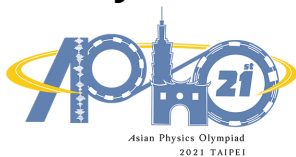
$P(\alpha, \beta) =$

$P(\alpha, \beta_{\perp}) =$

$P(\alpha_{\perp}, \beta) =$

$P(\alpha_{\perp}, \beta_{\perp}) =$

Theory



A2-6

English (Official)

C.5 (0.5 pt)

Expression of $S =$

Values of $S =$

Consistency with classical theories: