Schnupp

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1 Schnupp asymmetry measurement

1.1 Time of flight meausurement

By measuring the flight time of photon to the ITMs, we can know the Schnupp asymmetry. The flight time difference corresponds to the difference of the optimal phase for the PDH signal in each arm.

The optimal demodulation phase for each arm, θ_x and θ_y, can be derived as

$\theta_i = \frac{(L_1+2L_i+L_2)}{c}\omega_m \quad (i = x, y),$

where L_1 is distance from an EOM to the BS, L_i is distance from the BS to the ITMX(Y), and L_2 is distance from the BS to the PD. Therefore, the difference of the optimal demodulation phase $theta_d$ for each arm can be derived as

$\theta_d = \theta_x - \theta_y = \frac{2(L_x-L_y)}{c}\omega_m.$

The Schnupp asymmetry L_d can be derived as

$L_d = L_x - L_y = \frac{\theta_d}{2\omega_m}c$

[21]:
```
import numpy as np
theta_x = 122.2*np.pi/180
theta_y = 121.2*np.pi/180
theta_d = theta_x-theta_y+2*np.pi
omega_m = 45e6*2*np.pi
c=3e8
L_d = theta_d/2/omega_m*c
print(str(L_d) + ' m')
```

```
3.3425925925925926 m
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