8.2.1

(1) $x_1(t) = v(t - t_A)$

(2) $x_2(t) = vt + \frac{L}{2} - vt_A$

(3) $x_3(t) = 1(t - t_A) = t - t_A$

2 $x_2(t_M) = x_3(t_M)$

$v(t_M - t_A) + \frac{L}{2} = t_M - t_A$

$(t_M - t_A)(v-1) = -\frac{L}{2}$

$t_M - t_A = -\frac{L/2}{v-1}$

$t_A = t_M - \frac{L/2}{1-v}$ ∎

As the emmission of the light beam is defined as the origo event, It is emmited at the origo event

~~3 $x_R(t) =$~~

3. $x_R(t) = L - (t - t_B)$

$$x_R(t_m) = L - t_m + t_B = v(t_m - t_A) + \frac{L}{2} = x_2(t_m)$$

$$t_B = v(t_m - t_A) - \frac{L}{2} + t_m$$

$$= v\left(t_m - t_m + \frac{L/2}{1-v}\right) - \frac{L}{2} + t_m$$

$$= v\frac{L/2}{1-v} - \frac{L}{2} + t_m$$

$$x_R(t) = L - (t) + v\frac{L/2}{1-v} - \frac{L}{2} + t_m$$

$$= \frac{L}{2} + v\frac{L/2}{1-v} + t_m - t$$

$$x_R(t_C) = x_1(t_C)$$

$$\frac{L}{2} + v\frac{L/2}{1-v} + t_m - t_C = v(t_C - t_A)$$

$$\frac{L}{2} + \cancel{v\frac{L/2}{1-v}} + t_m - t_C = v t_C - v t_m + \cancel{v\frac{L/2}{1-v}}$$

$$\frac{L}{2} + t_m + v t_m = v t_C + t_C$$

$$\frac{L}{2} + (1+v) t_m = (1+v) t_C$$

$$t_C = t_m + \frac{L/2}{1+v}$$

■

4 $\Delta t = t_C - t_A = t_M + \frac{L/2}{1+V} - t_M + \frac{L/2}{1-V} =$

$$= \frac{L}{2}\left(\frac{1}{1+V} + \frac{1}{1-V}\right) = \frac{L}{2}\left(\frac{1-V+1+V}{(1+V)(1-V)}\right) =$$

$$= \frac{L}{1-V^2}$$

$$\Delta t' = t_C' - t_A' = t_C' - 0$$

$$V t_C' = L' - t_C'$$

$$t_C' = \frac{L'}{1+V}$$

$$\Delta t' = \frac{L'}{1+V}$$

$$\frac{\Delta t'}{\Delta t} = \frac{\frac{L'}{1+V}}{\frac{L}{1-V^2}} = \frac{L'(1-V)}{L}$$