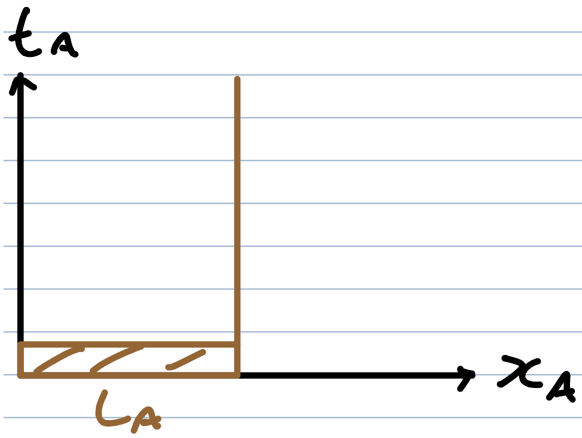

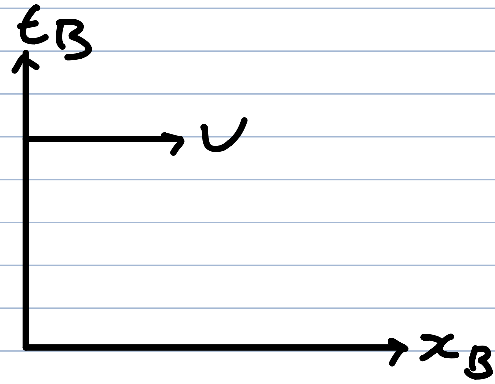

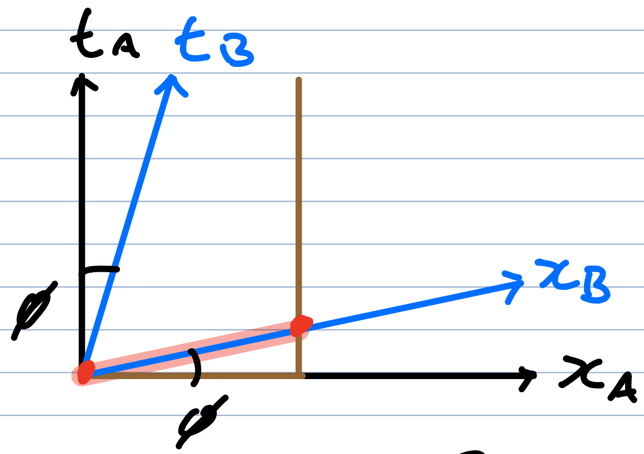

$\tan\phi = v$

$$\Delta S_A^2 = L_A^2 - (v L_A)^2 = L_A^2 (1 - v^2)$$

$$\Delta S_B^2 = L_B^2$$

$$\Delta S_A = \Delta S_B$$

$$L_B = L_A \sqrt{1 - v^2}$$

Length contraction

$$L = l \sqrt{1 - \frac{v^2}{c^2}}$$

10^{-14}

$\Gamma = 4 \text{ MeV}$

$$\tau = \frac{\hbar}{\Gamma} = \frac{6.63 \times 10^{-34}}{2\pi \times 4 \times 10^{6} \times 1.6 \times 10^{-19}}$$

$$= 1.65 \times 10^{-22} \text{ s}$$

$$L < 1.65 \times 10^{-22} \times 3 \times 10^{8}$$

$$\sim 10^{-14}$$

$$\frac{\hbar}{mc}$$

$\gamma m v$

$g \in G$

$$\sum_{i=1}^{K} \dim(R_i)^2 = |G|$$

K = # of conjugacy classes

$G = S_3$

$R_0, \quad R_1, \quad R_2$

Trivial rep

$\dim(R_0) = 1$

$$1 + \dim(R_1)^2 + \dim(R_2)^2 = 6$$

$$\dim(R_1)^2 + \dim(R_2)^2 = 5$$

$\dim(R_1) = 1$

$\dim(R_2) = 2$

$\chi(R_i) = \mathrm{Tr}(R_i)$

χ's are class functions

S_3:

$M : \{1,2,3\} \longrightarrow \{1,2,3\}$

$$e = \begin{pmatrix} 1 & 2 & 3 \\ \hline 1 & 2 & 3 \end{pmatrix} \rightarrow (1)$$

$$g_1 = \begin{pmatrix} 1 & 2 & 3 \\ \hline 2 & 1 & 3 \end{pmatrix} \rightarrow (1\ 2)$$

$$1 \rightarrow 2 \rightarrow 1 = (1\ 2)$$

$$g_2 = \begin{pmatrix} 1 & 2 & 3 \\ \hline 3 & 2 & 1 \end{pmatrix} = (1\,3)$$

$$1 \rightarrow 3 \rightarrow 1$$

$$g_3 = \begin{pmatrix} 1 & 2 & 3 \\ \hline 1 & 3 & 2 \end{pmatrix} = (2\,3)$$

$$2 \rightarrow 3 \rightarrow 2$$

$$g_4 = \begin{pmatrix} 1 & 2 & 3 \\ \hline 3 & 1 & 2 \end{pmatrix} = (132)$$

$$1 \to 3 \to 2 \to 1$$

$$g_5 = \begin{pmatrix} 1 & 2 & 3 \\ \hline 2 & 3 & 1 \end{pmatrix} = (123)$$

$$1 \to 2 \to 3 \to 1$$

$$g_i \sim g_j$$

$\exists g \in G \quad g g_i = g_j g$

$$C_0 = \{e\}$$

$$C_1 = \{g_1, g_2, g_3\}$$ ← χ's are the same for every element in a class

$$C_2 = \{g_4, g_5\}$$

$$K = \# \text{ reps} = \# \, C\text{'s}$$

$$\sum_{i=1}^{K} \dim(R_i)^2 = |G| = 6$$

$$1 + \dim(R_1)^2 + \dim(R_2)^2 = 6$$

$$\dim(R_1) = 1 \quad , \quad \dim(R_2) = 2$$

$$R_1(g_1) = R_1(g_2) = R_1(g_3)$$

$$g_1 = g_1^{-1} \rightarrow g_1 g_1 = e$$

$$R_1(g_1)\, R_1(g_1) = R_1(e) = 1$$

$$[R_1(g_1)]^2 = 1$$

$R_1(g_i) = \pm 1$ where $i = 1, 2, 3$

$$g_1 g_2 = g_4$$

$$\begin{pmatrix} 1 & 2 & 3 \\ 2 & 1 & 3 \\ 3 & 1 & 2 \end{pmatrix}$$

$$R_1(g_1)\,R_1(g_2) = R_1(g_4)$$

$$R_1(g_i) = -1$$
$i = 1, 2, 3$

$$R_1(g_j) = +1$$
$j = 4, 5$

as $\quad R_1(g_4)^2 = 1$

Character table:

	C_0	C_1	C_2
R_0	1	1	1
R_1	1	-1	$+1$
R_2	2	0	-1

$$(\chi_0, \chi_2) = \sum_{g \in G} \chi_0^*(g)\,\chi_2(g) = 0$$

$$1\times 2 + 3(1\times a) + 2(1\times b) = 0$$

$$\boxed{3a + 2b = -2}$$

$$(\chi_1, \chi_2) = \sum_{g\in G} \chi_1^*(g)\,\chi_2(g) = 0$$

$$= 2 - 3a + 2b = 0$$

$$\boxed{2b - 3a = -2}$$

$$b = -1$$

$$a = 0$$