

**Special Relativity**

$$\Delta s^2 = -\Delta t^2 + \Delta x^2 + \Delta y^2 + \Delta z^2 \quad \text{Spacetime interval (S. 1.1)}$$

$$\Delta \bar{s}^2 = \Delta s^2 \quad \text{Invariance of the interval (S. 1.7)}$$

$$\bar{t} = \gamma(t - vx) \quad \text{Lorentz Transforms (S. 1.12)}$$

$$\bar{x} = \gamma(v - vt)$$

$$\Delta x^{\bar{\alpha}} = \Lambda^{\bar{\alpha}}_{\beta} \Delta x^{\beta} \quad \text{Lorentz Transformation (S. 2.4)}$$

$$\vec{A} \xrightarrow{\mathcal{O}} A^{\alpha} \quad \text{Components of the vector } \vec{A} \text{ (S. 2.7)}$$

$$(\vec{e}_{\alpha})^{\beta} = \delta_{\alpha}^{\beta} \quad \text{Definition of the basis vectors (S. 2.10)}$$

$$\vec{A} \rightarrow A^{\alpha} \vec{e}_{\alpha} \quad \text{The vector } \vec{A} \text{ in terms of the basis vectors (S. 2.10)}$$

$$\vec{e}_{\alpha} = \Lambda^{\bar{\beta}}_{\alpha} \vec{e}_{\bar{\beta}} \quad \text{Lorentz transform of basis vectors (S. 2.13)}$$

$$\Lambda^{\bar{\beta}}_{\alpha} = \begin{pmatrix} \gamma & -v\gamma & 0 & 0 \\ -v\gamma & \gamma & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \quad \text{Components of the } \Lambda \text{ tensor (S. p38)}$$

$$\vec{e}^{\nu}_{\bar{\mu}}(-\vec{v}) e_{\bar{\nu}} \quad \text{Inverse Lorentz transform (S. 2.15)}$$

$$\vec{e}_{\alpha} = \delta^{\nu}_{\alpha} \vec{e}_{\nu} \quad \text{Basis vector identity (S p40)}$$

$$\Lambda^{\nu}_{\bar{\beta}}$$