KAP 7: S.R.

- c invariant $\Rightarrow x^2+y^2+z^2-c^2t^2$ invariant (under LT)
- 4-vektor: $x_\mu = (\vec{r}, ict)$, dvs $x_4 = ict$ (kompleks metrikk)
- $x_\mu x_\mu$ invariant
- LT = ortogonal transf. i Minkowskirommet
- $x' = \mathbb{L} x$ med $\mathbb{L} = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & \gamma & i\beta\gamma \\ 0 & 0 & -i\beta\gamma & \gamma \end{pmatrix}$
- reell metrikk: $ds^2 = g_{\mu\nu}\, dx_\mu\, dx_\nu$; $x_\mu = g_{\mu\nu} x^\nu$; $x^\mu = g^{\mu\nu} x_\nu$

  $\Rightarrow ds^2 = dx_\mu\, dx^\mu$ = invariant

  $x_4 = ict \Rightarrow g = \begin{pmatrix} 1 & & & \\ & 1 & & \\ & & 1 & \\ & & & 1 \end{pmatrix}$, $\mathrm{Tr}\, g = 4$, $dx^\mu = dx_\mu$

  $x_0 = ct \Rightarrow g = \begin{pmatrix} 1 & & & \\ & -1 & & \\ & & -1 & \\ & & & -1 \end{pmatrix}$ $\mathrm{Tr}\, g = -2$ eller $g = \begin{pmatrix} -1 & & & \\ & 1 & & \\ & & 1 & \\ & & & 1 \end{pmatrix}$ $\mathrm{Tr}\, g = +2$

- forminvarians av tensorlign: $C_{\mu\nu} = D_{\mu\nu} \Rightarrow C'_{\mu\nu} = D'_{\mu\nu}$
- egentid τ: $dx_\mu\, dx_\mu = -c^2 d\tau^2$
- tidsdilatasjon: $dt = \gamma\, d\tau > d\tau$
- romrettet 4-vektor $x_\mu \Rightarrow x_\mu x_\mu > 0$

  tidsrettet ——"—— $\Rightarrow x_\mu x_\mu < 0$

  null ——"—— $\Rightarrow x_\mu x_\mu = 0$

- 4-hastighet: $u_\mu = dx_\mu / d\tau = \gamma(\vec{v}, ic)$; $u_\mu u_\mu = -c^2$
- 4-strømtetthet: $j_\mu = (\vec{j}, ic\rho) = (\rho\vec{v}, ic\rho) = \rho_0 u_\mu$; $\rho = \gamma\rho_0 > \rho_0$
- 4-potensial: $A_\mu = (\vec{A}, i\,\Phi/c)$
- Maxwell: $\Box^2 A_\mu = -\mu_0 j_\mu$; $\Box^2 = \nabla^2 - \frac{1}{c^2}\frac{\partial^2}{\partial t^2} = \partial_\mu \partial_\mu$
- Lorentzbet: $\partial_\mu A_\mu = 0$ (invariant)
- Kont.lign: $\partial_\mu j_\mu = 0$ (invariant)