

Kompletterande facit till Kleppner-Kolenkow

- 12.1. a. $x' = 5 \text{ m}, t' = -10 \cdot 10^{-9} \text{ s}$
b. $x' = -225 \cdot 10^6 \text{ m}, t' = 1.25 \text{ s}$
c. $x' = 0, t' = 0.8 \text{ s}$
d. $x' = 800 \cdot 10^6 \text{ m}, t' = 0$
- 12.2. $v = -2.4 \cdot 10^8 \text{ m/s}$ eller $v = 0$
- 12.4. a. $\cos \theta = \frac{\cos \theta_0 + \frac{v}{c}}{1 + \frac{v}{c} \cos \theta_0}$
b. $v = (1 - 5 \cdot 10^{-7})c$
- 12.5. $v = 0.99995c$
- 12.6. $\ell = \frac{\sqrt{(c^2 - v^2)(c^2 - u^2)}}{c^2 - uv} \ell_0$
- 12.7. a. $662.7 \cdot 10^{-9} \text{ m}$
b. $25d$
- 12.9. $T = \frac{h}{c} + \frac{D}{c}(n-1)\sqrt{\frac{1 - \frac{v}{c}}{1 + \frac{v}{c}}}$
- 12.12.a. $v = \frac{a_0 t}{\gamma}$ eller $v = \frac{a_0 t}{\sqrt{1 + (\frac{a_0 t}{c})^2}}$
b. $v = (1 - 5 \cdot 10^{-7})c, v = \frac{c}{\sqrt{2}}, v = (1 - 5 \cdot 10^{-7})c$
- 13.1. 5 min
- 13.2. a. 0.13
b. 0.038 MeV resp. 69 MeV
- 13.4. $E = \frac{1 + \frac{v^2}{c^2}}{1 - \frac{v^2}{c^2}} m_0 c^2$
- 13.5. $v_f = \frac{\gamma v m}{\gamma m + M}$, där $\gamma = (1 - \frac{v^2}{c^2})^{-1/2}$
- 13.6. $m = m_0 \sqrt{2(x+2)}$
- 13.7. $u = \frac{v}{1 + \sqrt{1 - \frac{v^2}{c^2}}}$
 $E = \frac{E_0}{1 + \frac{E_0}{E_f}} (1 + v)$
- 13.8. a. $\frac{c}{c}$
b. $\geq 0.01 \text{ \AA}$
- 13.9. $2 \cdot 10^8 \text{ N}$ jämfört med $4 \cdot 10^{22} \text{ N}$
- 13.10. $78 \mu\text{m}$
- 13.11. $\cot \phi = (1 + \frac{E_0}{m_0 c^2}) \tan \frac{\theta}{2}$
- 14.1.a. $v/c \approx 0.74$
b. $\theta \approx 42^\circ$
- 14.2. cirka 145 MeV
- 14.3. 2.04 MeV
- 14.5. $K_1 = (\frac{Q}{2M_2 c^2} + \frac{M_1}{M_2} + 1)Q$
- 14.7. $\mathbf{a} = \gamma^4(1, 0, 0, \frac{u}{c})\mathbf{a}$, där $a = \frac{du}{dt}$