$m = 9000\ kg$

$v_{fin} = 0{,}85\,c$

ESERCITAZIONE n 3

$\gamma = 1{,}898$ (*)

(A) $\Delta E_1 = m_0 c^2 (\gamma - 1) = 9000\ kg \cdot \left(3 \cdot 10^8 \frac{m}{s}\right)^2 \cdot \left(\frac{1}{\sqrt{1 - \left(\frac{0{,}85\,c}{c}\right)^2}} - 1 \right) = 7{,}266 \cdot 10^{20}\ J$

(B) $P = 200\ MW \qquad P = \frac{L}{\Delta t}$

$\Delta t = \frac{L}{P} = \frac{7{,}266 \cdot 10^{20}\ J}{200 \cdot 10^6\ W} = 3{,}635 \cdot 10^{12}\ s = 115.186{,}2$ anni

$365{,}25 \cdot 24 \cdot 3600\ s$

$\gamma = 2{,}294$

(C) $\Delta E_2 = m_0 c^2 (\gamma - 1) = \dots = 1{,}048 \cdot 10^{21}\ J$

DIFFERENZA $\Delta E_2 - \Delta E_1 = 3{,}2 \cdot 10^{20}\ J$

(D) $E_{CIN\ oss\ 1} = \frac{1}{2} m v_1^2 = \frac{1}{2}\ 9000\ kg \left(0{,}85 \cdot 3 \cdot 10^8 \frac{m}{s}\right)^2 = 2{,}92 \cdot 10^{20}\ J$

$E_{CIN\ oss\ 2} = \quad v_2^2 \quad (0{,}9 \quad)^2 = 3{,}28 \cdot 10^{20}\ J$

$\Delta E = 3{,}6 \cdot 10^{19}\ J$

(E) $p_{cl} = m v = 9000\ kg \cdot 0{,}85 \cdot 3 \cdot 10^8 \frac{m}{s} = 2{,}295 \cdot 10^{12}\ kg \frac{m}{s}$

$p_{rel} = \gamma m v = 1898 \cdot 2 \cdot 295 \cdot 10^8\ kg \frac{m}{s} = 4{,}355 \cdot 10^{12}\ kg \frac{m}{s}$

(*) $\gamma = \frac{1}{\sqrt{1 - 0{,}85^2}} = 1{,}898$