

The energy of the proton was calculated previously, and this is assumed to be only kinetic energy:

$$KE = \frac{1}{2}mv^2 = 4.7066 \times 10^{-13}J$$

$$v^2 = \frac{2 \times (4.71 \times 10^{-13})}{m}$$

As the proton will probably be accelerated to speeds close to the speed of light, its relative mass will be used, with the special relativity mass equation:

$$m_R = \frac{m}{\sqrt{1 - \left(\frac{v^2}{c^2}\right)}}$$

$$\text{Where } v^2 = \frac{2 \times (4.71 \times 10^{-13})}{m}$$

$$v^2 = 2 \times (4.71 \times 10^{-13}) \div \frac{1.6726209 \times 10^{-27}}{\sqrt{1 - \left(\frac{v^2}{c^2}\right)}}$$

$$v^2 = 2 \times (4.71 \times 10^{-13}) \times \frac{\sqrt{1 - \left(\frac{v^2}{c^2}\right)}}{1.6726209 \times 10^{-27}}$$

$$2.79766 \times 10^{-54} \times v^4 = 4 \times (4.71 \times 10^{-13})^2 \times \left(1 - \left(\frac{v^2}{c^2}\right)\right)$$

$$2.79766 \times 10^{-54} \times v^4 = 8.86 \times 10^{-25} \left(1 - \left(\frac{v^2}{c^2}\right)\right)$$

$$2.79766 \times 10^{-54} \times v^4 = 8.86 \times 10^{-25} - \left(8.86 \times 10^{-25} \left(\frac{v^2}{c^2}\right)\right)$$

$$c^2 \times 2.79766 \times 10^{-54} \times v^4 + (8.86 \times 10^{-25} \times v^2) = 8.86 \times 10^{-25} \times c^2$$

$$(9 \times 10^{16} \times 2.79766 \times 10^{-54} \times v^4) + (8.86 \times 10^{-25} \times v^2) = 7.97475 \times 10^{-8}$$

$$4\log(2.51789485 \times 10^{-37} \times v) + 2\log(8.86 \times 10^{-25} \times v) = \log(7.97475 \times 10^{-8})$$

$$2\log(2.51789485 \times 10^{-37} \times v) + \log(8.86 \times 10^{-25} \times v) = \frac{\log(7.97475 \times 10^{-8})}{2}$$

$$2\log(2.51789485 \times 10^{-37} \times v) + \log(8.86 \times 10^{-25} \times v) = -3.549161884$$

$$\log((2.51789485 \times 10^{-37} \times v)^2 \times (8.86 \times 10^{-25} \times v)) = -3.549161884$$

$$\log((6.33979 \times 10^{-74} \times v^2) \times (8.86 \times 10^{-25} \times v)) = -3.549161884$$

$$\log(5.6170579 \times 10^{-98} \times v^3) = -3.549161884$$

$$5.6170579 \times 10^{-98} \times v^3 = 10^{-3.549161884}$$

$$v^3 = \frac{2.82382719 \times 10^{-4}}{5.6170579 \times 10^{-98}} = 5.0272355 \times 10^{93}$$

$$v = 1.713 \times 10^{31}m/s$$