Modern Homework 18

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1. When the wave meets the immoveable barrier, then obviously it can't move that node. So, we see the stationary node example and see the total wave has to be destroyed at the wall and replaced with a wave fliped over the string

good

Since the wave is deconstructively interferent every 0.74pm. Because 0.74 pm, they must intract every 0.74pm. Because of the symmetry, $\lambda = 2(0.74\text{pm})$ OK
↳ lets call this α for a sec.

0.724 pm

What does this mean?

DeBroglie:

$$p = \frac{h}{\lambda}$$

$$\frac{1}{c}\sqrt{(k+mc^2)^2 - (mc^2)^2} = \frac{h}{2\alpha}$$

$$(k+mc^2)^2 = \frac{c^2h^2}{4\alpha^2} + (mc^2)^2$$

$$k = \sqrt{\frac{c^2h^2}{4\alpha^2} + (mc^2)^2} - mc^2$$ ✓

a) photons:

$$k = E = \frac{hc}{\lambda} = \frac{hc}{2\alpha} \Rightarrow \cancel{0.83}\ 0.84\text{ MeV}$$ OK

b) electrons:

$m = 0.511\text{ MeV}/c^2$

$k = 0.47\text{ MeV}$ OK

c) Protons:

$m = 938.77\text{ MeV}/c^2$

~~[illegible]~~ $k = 370\text{ eV}$ OK