3. Conservation of momentum requires that the gamma ray particles move in opposite directions with momenta of the same magnitude. Since the magnitude p of the momentum of a gamma ray particle is related to its energy by $p = E/c$, the particles have the same energy E. Conservation of energy yields $m_\pi c^2 = 2E$, where m_π is the mass of a neutral pion. According to Table 45-4, the rest energy of a neutral pion is $m_\pi c^2 = 135.0\,\text{MeV}$. Hence, $E = (135.0\,\text{MeV})/2 = 67.5\,\text{MeV}$. We use the result of Exercise 3 of Chapter 39 to obtain the wavelength of the gamma rays:

$$\lambda = \frac{1240\,\text{eV}\cdot\text{nm}}{67.5 \times 10^6\,\text{eV}} = 1.84 \times 10^{-5}\,\text{nm} = 18.4\ \text{fm}\ .$$