According to the problem statement, the total energy of the particle of rest mass \( m \), is twice as much as \( E_0 \), its rest energy: \( E = \gamma mc^2 = 2.000E_0 = 2.000mc^2 \), where we used Eq. (26.13). Thus \( \gamma = \frac{1}{\sqrt{1 - v^2/c^2}} \) = \( E/E_0 = 2.000 \), which we solve for \( v \), the speed of the particle:

\[
v = c \sqrt{1 - \frac{1}{\gamma^2}} = c \sqrt{1 - \frac{1}{(2.000)^2}} = 0.866 \cdot c.
\]

The kinetic energy is the difference between the total energy \( E \) and the rest energy \( E_0 \) of the particle: \( KE = E - E_0 = 2E_0 - E_0 = E_0 = 1000 \text{ MeV} \).

According to Eq. (26.12), the total energy \( E \) is the sum of the kinetic energy \( KE \) and the rest energy \( E_0 \): \( E = KE + E_0 \). Since the total energy of the muon is \( E = 106.7 \text{ MeV} \) while its rest energy is \( E_0 = 105.7 \text{ MeV} \), the kinetic energy of the muon must be \( KE = E - E_0 = 106.7 \text{ MeV} - 105.7 \text{ MeV} = 1.0 \text{ MeV} \).