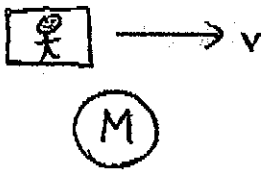
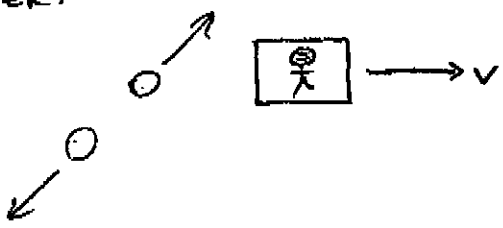
A stationary particle of mass M decays into two particles. According to an observer moving at speed v relative to the original particle, the total energy of the particles after the collision is

BEFORE:



AFTER:



A) Equal to Mc^2

B) Greater than Mc^2

C) Less than Mc^2

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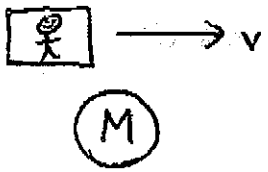
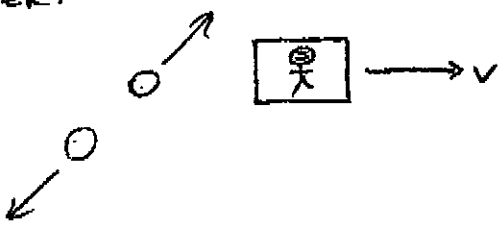


AFTER:



A) Equal to Mc^2

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In observer's frame:

total energy before

$= \gamma Mc^2 > Mc^2$

$\therefore$ total energy after

$= \gamma Mc^2 > Mc^2$

Two balls of pure gold at rest each contain exactly 10^{23} gold atoms. One ball is at room temperature, while the other ball is at 1000K. Which ball is more massive?

A) The cooler ball

B) The hotter ball

C) They have the same mass

Two balls of pure gold at rest each contain exactly 10^{23} gold atoms. One ball is at room temperature, while the other ball is at 1000K. Which ball is more massive?

A) The cooler ball

B) The hotter ball

- Same atoms but more kinetic energy ∴ total energy is greater.

C) They have the same mass

How does the mass of a hydrogen atom compare to the mass of a proton plus the mass of an electron?

A) It is the same: $m_H = m_e + m_p$

B) It is less: $m_H < m_e + m_p$

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Need to add energy to separate into proton & electron.

$\therefore m_H c^2 + \text{some energy} = m_p c^2 + m_e c^2$

$m_H < m_p + m_e$