Modern Physics

Standard Model and mass-energy equivalent practice problems

Write the quark combinations and charge for these particles

- 1. proton
- 2. anti-proton
- 3. neutron
- 4. anti-neutron

Write quark combinations for the following particles

- 1. meson with charge +1 e
- 2. meson with charge -1 e
- 3. baryon with charge 0 e
- 4. anti-baryon with charge +1

What charge and what classification are these quark combinations?

- 1. (up, up, down)
- 2. (anti-up, anti-up, anti-strange)
- 3. (anti-up, strange)
- 4. (down, anti-up)
- 5. (down, anti-up)
- 6. (anti-charm, strange)

Mass – Energy Equivalence
E = m c^2

- 1. How much energy is released when one proton is completely annihilated?
- 2. How much energy is released when one proton and one anti-proton collide and annihilate each other?
- 3. How much energy is released when one electron is completely annihilated?
- 4. How much energy is released when one electron and one anti-electron (“positron”) collide and annihilate each other?