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Which statement **cannot** be deduced from this experiment?

- A Atoms are mostly empty space.
- B Most of the mass of an atom is concentrated in the nucleus.
- C The nucleus of an atom contains protons.
- D The nucleus of an atom is small compared to the size of an atom.

- 39 Four nuclei are represented below.



Which statement about these nuclei is correct?

- A An uncharged atom of element Q has 24 orbital electrons.
  - B Nuclei G and M are isotopes of the same element.
  - C When E absorbs a neutron and then emits an  $\alpha$ -particle, E transforms into M.
  - D When M emits a  $\beta^-$  particle, M transforms into Q.
- 40 A neutron is composed of one up (u) quark and two down (d) quarks. When a neutron decays to a proton, a beta-particle is emitted.

What is the change in the quark structure of the neutron due to the emission of the beta-particle?

(The symbol for a neutrino is  $\nu_e$  and for an antineutrino is  $\bar{\nu}_e$ .)

- A  $d \rightarrow u + \beta^- + \nu_e$
- B  $d \rightarrow u + \beta^- + \bar{\nu}_e$
- C  $u \rightarrow d + \beta^+ + \nu_e$
- D  $u \rightarrow d + \beta^+ + \bar{\nu}_e$





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