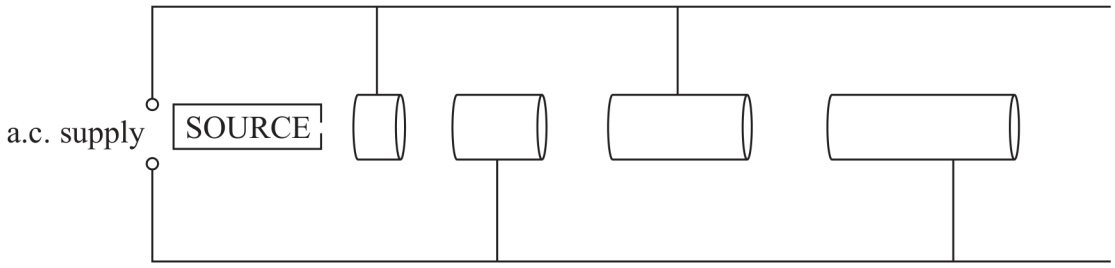
17 A particle collider can include a LINAC.

(a) The diagram represents a LINAC.



Explain why this arrangement works with a constant frequency a.c. supply.

(4)

(b) In a particle collider, a positron and an electron collided. Each particle had an energy of 14.5 GeV. The collision produced two particles of a type called omega baryons.

(i) An omega baryon has a mass equivalent to 3272 times the mass of an electron.

Show that the mass of an omega baryon is about 1700 MeV/c^2.

(4)

(ii) Calculate the kinetic energy of one of the omega baryons.

(3)

Kinetic energy = ...

(c) A student correctly suggests that this collision cannot lead to both particles being omega baryons, as this breaks a conservation law.

Discuss the student's suggestion.

(3)

(Total for Question 17 = 14 marks)