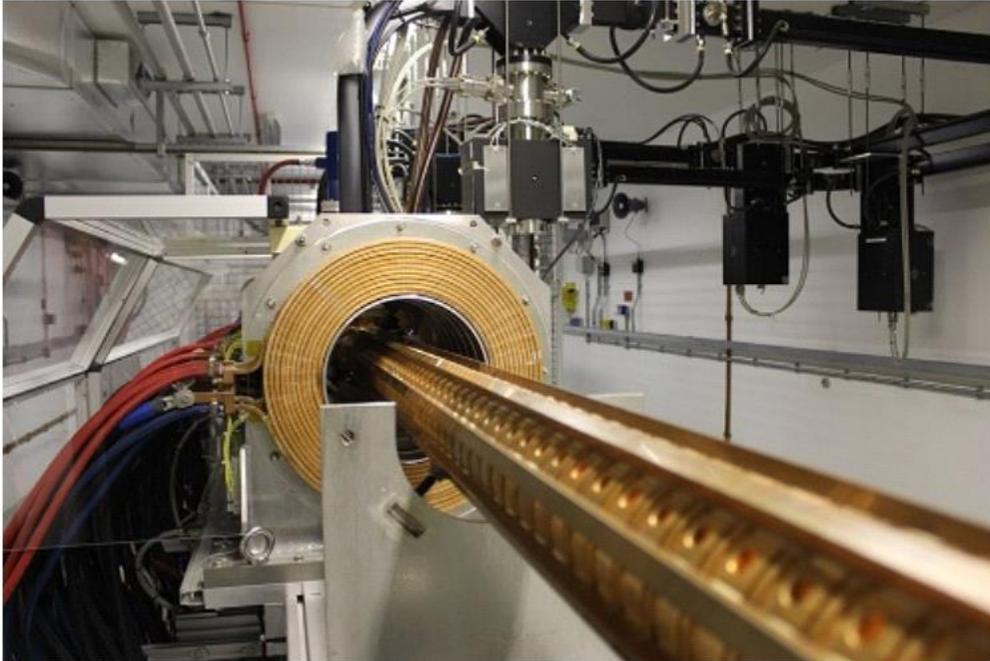


Question 4:

A metallic particle is accelerated in a magnetic field such that its velocity over time is defined by the function $v(t) = 4t^2 - 12$, where time is in seconds and velocity is in meters per second. If we assume that the particle has an initial position of zero ($x_0 = 0$), what are the equations that describe the acceleration and position over time?



$$v(t) = 4t^2 - 12$$

$$a(t) = \frac{dv(t)}{dt} = 8t$$

$$\boxed{a(t) = 8t}$$

$$x(t) = \int v(t) dt = \frac{4}{3}t^3 - 12t + C \quad \overset{\circ}{x(0) = 0}$$

$$\boxed{x(t) = \frac{4}{3}t^3 - 12t}$$