

## M04E.2—Classical Radiation from a Hydrogen Atom

### Problem

In a naïve classical model of the hydrogen atom's ground state, the electron moves in a circular orbit of radius  $r_0 = 0.53 \times 10^{-10}$  m around the center of mass of the electron-proton pair. Since the electron is accelerating, classically it will continuously radiate energy. Calculate the time it will take the electron to spiral into the proton, assuming its orbit is always nearly circular, and that the motion continues until the radius of the electron's orbit is reduced to that of the proton,  $10^{-15}$  m. Are relativistic effects important for this estimate?