

### Properties of the Bullet Cluster

The bullet cluster (1E 0657–558) is a pair of galaxy clusters that collided. The individual properties of the two clusters (1 and 2) and their relative properties are listed here:

$$z = 0.296$$

$$M_1 \approx 1.9 \times 10^{15} M_\odot$$

$$M_2 \approx 2.6 \times 10^{14} M_\odot$$

$$kT_1 = 14 \text{ keV X-ray temperature}$$

$$kT_2 = 6 \text{ keV X-ray temperature}$$

$$L_x = 1 \times 10^{39} \text{ J s}^{-1} \text{ X-ray luminosity}$$

$$d_{12} = 0.72 \text{ Mpc projected separation}$$

$$v_{12} \approx 2800 \text{ km s}^{-1} \text{ initial relative velocity}$$

100 Myr since collision