Astrophysics and space astronomy

Science, Astronomy



Astrophysics and space astronomy – Paper Example

Hotter, more massive stars burn hydrogen more quickly than cooler, less massive stars (see " Main Sequence Stars"). Stars above the turn-off mass leave the main sequence because they have exhausted the hydrogen at their cores (Kaufmann, pp. 393-399), leaving a helium core with a hydrogenburning shell; the core shrinks as the star expands and becomes a red giant. As a red giant, they are cooler and brighter than the main sequence stars.

Possibilities for what massive stars that have left the main sequence may look like include: a red giant, planetary nebula, white dwarf, or black hole (Smith).

1b)

Larger mass stars burn hydrogen faster than lower mass stars, so usually, it is the larger mass stars that leave the main sequence first. A star's luminosity is proportional to mass (Danforth). This makes the existence of blue stragglers (which from H-R diagrams, have higher luminosity than other main sequence stars) surprising since they are more massive than many stars that have already left the main sequence

Another possible cause of blue stragglers is a process by which hydrogen from outer layers of the star becomes mixed into the core, so that core hydrogen burning can continue long after stars of similar mass have become red giants (Kaufmann, p. 399).

Main sequence binaries can form a sequence of stars displaced to the red of the main sequence stars (Bailyn and Rubenstein); therefore a large population of binaries may shift the main sequence ridgeline to the red and change the globular cluster luminosity function.

So the Galactic center tidal force is 9040 times weaker than the force of gravity at Earth. But the tidal force at the 10 solar mass black hole is approximately 20 million times stronger than the force of gravity at the Earth's surface.

Using the difference of the tidal force between that on your feet and on your head:

Ftidal = G M m / Rs2 - G M m / (Rs + h)2

The tidal force near a 10 solar mass black hole is:

Ftidal = (6. 67 x 10-11 Nm2/kg2)(10)(1. 99 x 1030 kg) (70 kg) / (2. 95 x 104 m)2 +

- (6. 67 x 10-11 Nm2/kg2)(10)(1. 99 x 1030 kg) (70 kg) / (2. 95 x 104 m + 2 m) 2

= (1. 0677 - 1. 0675) x 1014 N = 1. 45 x 1010 N