**Answer on Question #69703 – Physics - Astronomy | Astrophysics**

The mean free path of photons in stars is of the order of 0.2 cm. Show that the time taken for a photon to reach the surface of a star of radius 4 $R_\odot$ is of the order of one million year.

**Solution.** The distance d moved by a photon that random walks through N steps:

$$4R_\odot = l\sqrt{N},$$

where $l = 0.2cm.$

We have then the following number of steps

$$N = \frac{16R_\odot^2}{l^2}$$

and the following total time spent

$$t = Nt_1 = \frac{16R_\odot^2}{lc} = \frac{16\times(695700km)^2}{0.2\times10^{-5}km\times299792\frac{km}{s}} \approx 1.3\times10^{13}s \approx 0.41\times10^6 years$$

**Answer.** $0.41\times10^6 years.$