

Watch video – plasma rain – what are some things you notice? Questions you have?

Energy!

Sun produces 3.85×10^{26} Joules per second

Describe Luminosity

Power emitted by star $\frac{J}{s} = W$

That is equivalent to how many kg of matter a second?

$$E = mc^2 \quad \frac{E}{c^2} = m = 4 \times 10^9 \text{ kg/s}$$

Describe Flux using luminosity

Flux is the power per unit area $F_0 = \frac{L_0}{4\pi R_0^2}$

The Sun is 7×10^8 meters in radius

What is the solar flux at the Sun's surface?

$$F_0 = 6 \times 10^7 \text{ W/m}^2$$

The Stefan Boltzman constant is 5.67×10^{-8}

What is the blackbody flux?

$$F_0 = \sigma T_0^4$$

What is the temperature of the Sun?

$$T_0 = \left(\frac{F_0}{\sigma}\right)^{1/4} = 5778 \text{ K}$$

What is the solar flux at Earth?

$$F_{\text{Earth}} = \frac{L_0}{4\pi a_{\text{Earth}}^2} = 1367 \text{ W/m}^2$$