Sun

Power $\sim (kT)^4 = 3.8 \cdot 10^{26}$ W

$n(E \dots E+dE) = \cdot \frac{g(E)\,dE}{e^{(E-N)/kT} - 1}$ = Boltzmann ≤ Phase space Volume

Bose-Einstein

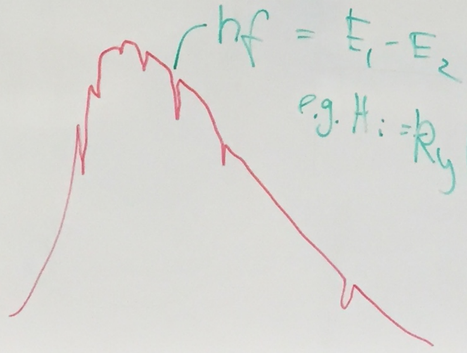
or $= C \cdot \frac{g(E)\,dE}{e^{E/kT}}$

σT^4

$T \simeq 5780$ K

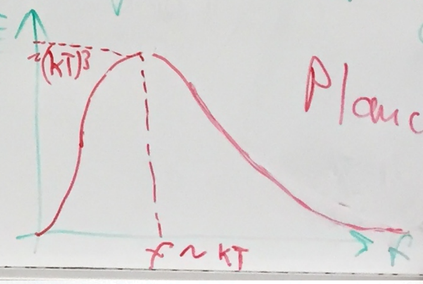
$f_{max} \simeq$ green light

Sun spectrum:



$hf = E_1 - E_2$

e.g. H: $= R_y \left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$



Example: simple particles

$g(E)\,dE = 4\pi p^2 dp \cdot V$

Photons: $p_\gamma = E_\gamma / c$ $\left(\frac{E^2}{c^2} = m^2c^2 + p^2\right)$

$f = E_\phi / h$

$\lambda = \frac{h}{p}$

Spin-1 → Bosons

$\frac{\Delta E}{V} = 8\pi h \frac{f^3}{c^3} \frac{df}{e^{hf/kT} - 1}$

Planck's radiation formula

Blackbody spectrum

$E_{grav\ collapse} = ?$

$= \frac{3}{5} \frac{GM^2}{R_{final}}$

Sun $= 2.3 \cdot 10^{41}$ J

$2.3 \cdot 10^{41}$ J / $3.8 \cdot 10^{26}$ W = 19 Gyr

→ $^4He + ^4He + ^4He \rightarrow ^{12}C$

$+ ^4He \rightarrow ^{16}O$

→ end of the sun

→ collapse into white dwarf

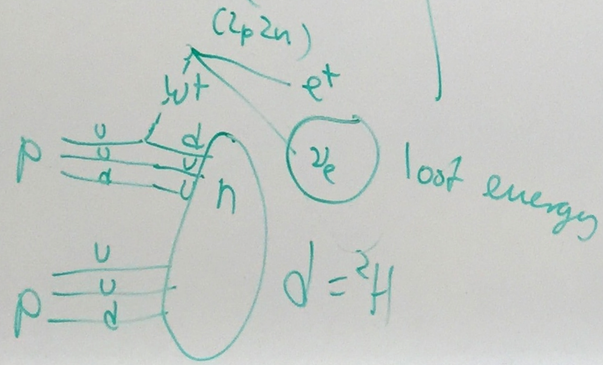
$R \simeq 10^7$ m

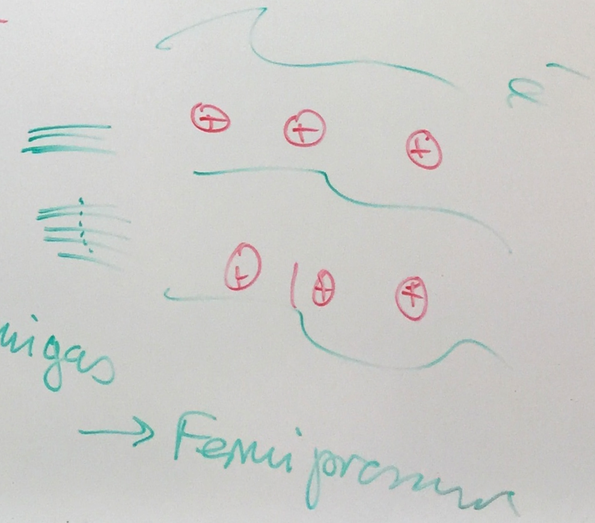
→ "Metal"

$M_A c^2 = \Sigma M_{n,p} c^2 - B.E.$

$B.E. \simeq 0.7\%\ M_A c^2$

$4\,^1H \rightarrow {}^4He$





□ well:

$E_n = \frac{h^2 \pi^2 n^2}{2mL^2}$