Desplazamiento de Wienn ;

```
Clear[h, k, c, x]
Solve[1 - 1 / Exp[x] - x / 3 == 0, x]
```

Solve::ifun : Inverse functions are being used by Solve, so some
solutions may not be found; use Reduce for complete solution information. >>

Out[3]= $\left\{\{x \to 0\}, \left\{x \to 3 + \text{ProductLog}\left[-\frac{3}{e^3}\right]\right\}\right\}$

In[4]:= `N[3 + ProductLog[-3/E^3], 100]`

Out[4]= 2.8214393721220788934031913302944851953458817440731140922798576939412143045055173912456865653478396644

Cálculo completo en Frecuencia ;

In[6]:= `ρ[f_, T_] := 8 π / c^3 f^2 h f / (Exp[h f / (k T)] - 1)`

In[7]:= `D[ρ[f, T], f]`

Out[7]= $\frac{24\, f^2\, h\, \pi}{c^3\left(-1 + e^{\frac{f\,h}{k\,T}}\right)} - \frac{8\, e^{\frac{f\,h}{k\,T}}\, f^3\, h^2\, \pi}{c^3\left(-1 + e^{\frac{f\,h}{k\,T}}\right)^2\, k\, T}$

In[8]:= `Solve[24 f^2 h π / (c^3 (-1 + E^(f h/(k T)))) - 8 E^(f h/(k T)) f^3 h^2 π / (c^3 (-1 + E^(f h/(k T)))^2 k T) == 0, f]`

Solve::ifun : Inverse functions are being used by Solve, so some
solutions may not be found; use Reduce for complete solution information. >>

Out[8]= $\left\{\left\{f \to \frac{k\, T\left(3 + \text{ProductLog}\left[-\frac{3}{e^3}\right]\right)}{h}\right\}\right\}$

In[9]:= `x = 3 + ProductLog[-3/E^3];`

In[10]:= `<< PhysicalConstants``

In[11]:= `h = PlanckConstant`

Out[11]= 6.62607×10^{-34} Joule Second

In[12]:= `k = BoltzmannConstant`

Out[12]= $\frac{1.38065 \times 10^{-23}\ \text{Joule}}{\text{Kelvin}}$

In[13]:= `c = SpeedOfLight`

Out[13]= $\frac{299\,792\,458\ \text{Meter}}{\text{Second}}$

In[14]:= `fmaxtoT = k / h x`

Out[14]= $\frac{5.87893 \times 10^{10}}{\text{Kelvin Second}}$

Cálculo en Longitud de Onda ;

```
Clear[h, k, c, x]
```

In[17]:=
```
ρλ[λ_, T_] := 8 π h c / (λ^5) 1 / (Exp[h c / (λ k T)] - 1)
```

In[18]:=
```
D[ρλ[λ, T], λ]
```

Out[18]=
$$\frac{8\,c^2\,e^{\frac{c\,h}{k\,T\,\lambda}}\,h^2\,\pi}{\left(-1+e^{\frac{c\,h}{k\,T\,\lambda}}\right)^2\,k\,T\,\lambda^7}-\frac{40\,c\,h\,\pi}{\left(-1+e^{\frac{c\,h}{k\,T\,\lambda}}\right)\lambda^6}$$

In[19]:=
```
NSolve[8 c^2 e^(c h/(k T λ)) h^2 π/(-1 + e^(c h/(k T λ)))^2 k T λ^7 - 40 c h π/(-1 + e^(c h/(k T λ))) λ^6 == 0, λ]
```

NSolve::nsmet : This system cannot be solved with the methods available to NSolve. ≫

In[20]:=
```
Solve[1 - 1/Exp[x] - x/5 == 0, x]
```

Solve::ifun : Inverse functions are being used by Solve, so some
solutions may not be found; use Reduce for complete solution information. ≫

Out[20]=
$$\left\{\{x\to 0\},\left\{x\to 5+\text{ProductLog}\left[-\frac{5}{e^5}\right]\right\}\right\}$$

In[21]:=
```
N[5 + ProductLog[-5/e^5], 10]
```

Out[21]= 4.965114232

In[22]:=
```
x = 5 + ProductLog[-5/e^5];
```

In[35]:=
```
h = PlanckConstant;
k = BoltzmannConstant;
c = SpeedOfLight;
ħ = PlanckConstantReduced;
```

In[26]:=
```
λmaxT = h c / ( k x)
```

Out[26]= 0.00289777 Kelvin Meter

Test λmax fmax;

Out[27]= fmax Test λmax

In[28]:=
```
fmaxtoT λmaxT
```

Out[28]=
$$\frac{1.70358\times 10^8\ \text{Meter}}{\text{Second}}$$

In[29]:=
```
h c
```

Out[29]= 1.98645×10^{-25} Joule Meter

In[33]:=
```
Convert[h c , ElectronVolt Angstrom]
```

Out[33]= 12398.4 Angstrom ElectronVolt

In[39]:=
```
Convert[ħ c , ElectronVolt Angstrom]
```

Out[39]= 1973.27 Angstrom ElectronVolt

12398.418754199978` Angstrom ElectronVolt

1973.2696312541852` Angstrom ElectronVolt

Stefan – Boltzmann;

In[43]:=
```
Clear[h, k, c, x]
```

In[44]:=
```
ρ[f_, T_] := 8 π / c^3 f^2 h f / (Exp[ h f / (k T) ] - 1)
```

In[45]:= **Integrate[ρ[f, T], {f, 0, Infinity}]**

Out[45]= $\text{ConditionalExpression}\left[\frac{8\ k^4\ \pi^5\ T^4}{15\ c^3\ h^3},\ \text{Re}\left[\frac{h}{k\ T}\right] > 0\right]$

In[46]:= **h = PlanckConstant;**
k = BoltzmannConstant;
c = SpeedOfLight;
ħ = PlanckConstantReduced;

In[50]:= **b = $\frac{8\ k^4\ \pi^5}{15\ c^3\ h^3}$**

Out[50]= $\frac{7.56577 \times 10^{-16}\ \text{Joule}}{\text{Kelvin}^4\ \text{Meter}^3}$

In[51]:= **Convert[b, ElectronVolt / (Kelvin ^ 4 Meter ^ 3)]**

Convert::temp : Warning: Convert[old,new] converts units of
temperature. ConvertTemperature[temp,old,new] converts absolute temperature. ≫

Out[51]= $\frac{4722.18\ \text{ElectronVolt}}{\text{Kelvin}^4\ \text{Meter}^3}$

Nro Fotones ;

In[52]:= **Clear[h, k, c, x]**

In[53]:= **Nf[f_, T_, V_] := 8 π / c ^ 3 f ^ 2 h f / (Exp[h f / (k T)] - 1) V / (h f)**

In[54]:= **Integrate[Nf[f, T, V], {f, 0, Infinity}]**

Out[54]= $\text{ConditionalExpression}\left[\frac{16\ k^3\ \pi\ T^3\ V\ \text{Zeta}[3]}{c^3\ h^3},\ \text{Re}\left[\frac{h}{k\ T}\right] > 0\right]$

In[55]:= **N[Zeta[3], 10]**

Out[55]= 1.202056903

In[56]:= **h = PlanckConstant;**
k = BoltzmannConstant;
c = SpeedOfLight;
ħ = PlanckConstantReduced;

In[60]:= **$\frac{16\ k^3\ \pi\ \ \text{Zeta}[3]}{c^3\ h^3}$**

Out[60]= $\frac{2.02869 \times 10^7}{\text{Kelvin}^3\ \text{Meter}^3}$

In[62]:= **2.0286918677723482`*^7 298 ^ 3 (0.01) ^ 3**

Out[62]= 5.36865×10^8

In[63]:= **b = $\frac{8\ k^4\ \pi^5}{15\ c^3\ h^3}$**

Out[63]= $\frac{7.56577 \times 10^{-16}\ \text{Joule}}{\text{Kelvin}^4\ \text{Meter}^3}$

In[65]:= **(b T ^ 4) / $\left(\frac{16\ k^3\ \pi\ T^3\ \ \text{Zeta}[3]}{c^3\ h^3}\right)$**

Out[65]= $\frac{3.72938 \times 10^{-23}\ \text{Joule T}}{\text{Kelvin}}$

In[66]:=
```
Convert[3.729382531620919`*^-23 Joule, ElectronVolt]
```

Out[66]= 0.00023277 ElectronVolt

In[67]:=
```
0.0002327697704891433` ElectronVolt 298
```

Out[67]= 0.0693654 ElectronVolt

In[70]:=
```
12398 / (0.0002327697704891433 × 5800)
```

Out[70]= 9183.26