```
c = 3 * 10^8; ϵ0 = 8.85 * 10^-12; ele = 1.6 * 10^-19; hbar = 1.05 * 10^-34;

Em = 6.0; (*MeV*)
Qcharge = .1 * 10^-12;(*charge*)
Nq = Qcharge / ele;
γ = Em / .511; α = ele^2 / (4 π ϵ0 hbar c);

λ1 = 400 * 10^-9;(*ccd range in nm for QE>50%*)
λ2 = 1050 * 10^-9;

ω1 = 2 π (c / λ2);
ω2 = 2 π (c / λ1);
nph = Nq (Log[γ] + 0.193) / 215 Log[ω2 / ω1] (*shorthand formula from Accel Handbook*)
```

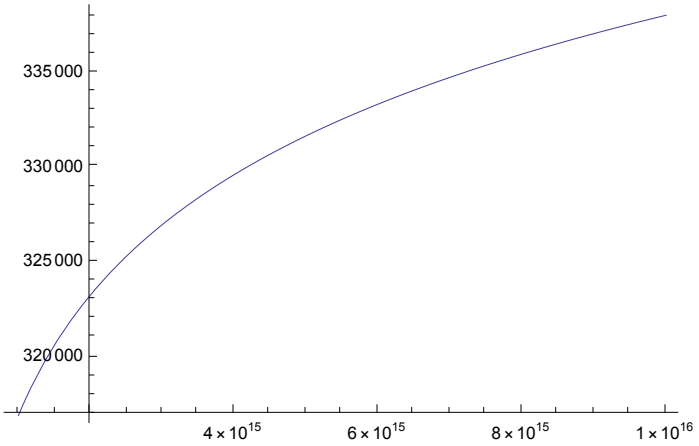
```
7451.73
```

```
dWW = Nq ele^2 / (4 π^2 ϵ0 c) (Log[4 γ^2 - 1]);
dnw[ω_] = Nq α / (π ω) (Log[4 γ^2 - 1]);
Energyper = dWW * Abs[ω2 - ω1]
Numberper = dWW * Abs[ω2 - ω1] / (hbar (ω2 - ω1));

nphoton = Integrate[dnw[ω], {ω, ω1, ω2}];

Print["Beam energy, charge : ", Em , " MeV, ", Qcharge * 10^12, " pC", "\n",
 "Bandpass λ: {", λ1 * 10^9, " - ", λ2 * 10^9, "}nm", "\n" ×
  "Number photons: " , "N_ph = ", nphoton]
```

```
2.81024 × 10^-15
```

```
Beam energy, charge : 6. MeV, 0.1 pC
Bandpass λ: {400 - 1050}nm
 Number photons: N_ph = 8854.26
```

```
NumberPhotFreq = Integrate[dnw[ω], ω];
Plot[%, {ω, 10^15, 10 * 10^15}]
```




```
(*What does the photodiode see?*)
Respons = .2 (*Det10A avg Responsivity from 200-1100nm A/W*);
riseTime = 2 * (1 * 10^-9); (*Det10A Rise time -- x2 for fall time*)
Rohm = 50; (*Ohm*)
Energyper / riseTime (*Power in W over rise time*)
(*facetFreq=10; (*Hz*)*)
(*avgPower=Energyper*facetFreq (*avg power*)*)
IA = Respons * (Energyper / riseTime) (*Amps*)
(*IA2=Respons*4*10^-3; (*alignment laser power *)*)
signalVolts = IA * Rohm (*Volts*)
```

```
0.0000600583
```

```
0.0000120117
```

```
0.000600583
```