```
ClearAll["Global`*"]
SetDirectory[NotebookDirectory[]]
```

C:\Users\Javier\Desktop\Física\Prácticas\Mathematica\Propagación
   MB 3 niveles\MBCPRFiles\Everything in 4000 Loop Files

CUIDADO: GUARDAR EL PROGRAMA EN CARPETA PROPIA CON EL
FICHERO CREACION DE DATOS

CUIDADO: CUANDO SE ABORTE EL PROGRAMA, CORRER EL CIERRE
DEL FICHERO EN LA ULTIMA LINEA O NO SE GUARDARÁN LOS DATOS
EN POSTERIORES EJECUCIONES DEL PROGRAMA

CUIDADO: PONER j, LONG, λP,λS,μP,LoopsPerDoc, N0 y μS IGUALES A
LOS DEL FICHERO CREACION DE DATOS

```
τ = 5; (*in ns*)
ti = 0; (*in ns*)
tf = 200; (*in ns*)
numpasos = (tf - ti) / 0.5;
ΩE = 0.2; (*in ns⁻¹*)
ΔE = 370 920; (*in ns⁻¹*)
ΔH = 370 920; (*in ns⁻¹*)
ℏ = 1 × 10⁻²⁵; (*J·ns*)
c = 3 × 10⁵; (*μm/ns*)
ε0 = 8.8541 × 10⁻¹⁸; (*in F/μm*)
N0 = 1 × 10⁴; (*Sacada de la ecuacion de los gases ideales,
igual para todos los gases*)
            (*Densidad atómica 137 (g/mol) ----BARIO---- in part/μm³*)
μP = 8 * 3.33 * 10⁻²⁴;
(*momento dipolar electrico------Bario----8 Debye(Debye=3.33 10⁻²⁴ C·μm)----*)
μS = 0.2 * 3.33 * 10⁻²⁴; (*momento dipolar electrico----Bario----0.2 Debye------*)
λP = 553.7 × 10⁻³; (*in μm*)
λS = 1500.4 × 10⁻³; (*in μm*)
kP = 2 π / λP; (*in μm⁻¹*)
kS = 2 π / λS; (*in μm⁻¹*)
ωP = kP c; (*in ns⁻¹*)
ωS = kS c; (*in ns⁻¹*)
ωE = (ωP - ωS) / 2; (*La energia entre los niveles 1 y 3 es La
 diferencia entre las energias dadas por los fotones de los laseres de
 stokes y probe. La mitad de esa energía corresponde a la frecuencia del
 láser de trigger que coincide con la frecuencia del laser generado.*)
kE = ωE / c
ωH = ωE;
Δk = 0; (*in free space*)

βE = ωE N0 (Abs[μS])² / (2 ε0 c ℏ ΔE)
βH = ωH N0 (Abs[μP])² / (2 ε0 c ℏ ΔH)

ΩE0 = ΩE Exp[-2 Log[2] ((t - (tf - ti) / 2) / τ)²];
ΩH0 = 0;

j = 200;
(*j is the number of loops*)
LONG = 1; (*in μm*)
ξi = 0;
ξf = LONG / (j);
paso = LONG / (j) (*in μm*)
```

3.57998

2.41754×10^{-8}

0.0000386807

$$\frac{1}{200}$$

```
(*En el siguiente Do separado guardamos el tiempo para
 calcularlo sólo una vez en vez de una por cada iteración*)
t = ti;
Listatime = {};
```

```mathematica
Do[
  Listatime = Append[Listatime, t];
  t2 = t;
  Clear[t];
  t = t2 + 0.5,
  {numpasos}];
SetOptions[
  OpenWrite[StringJoin["Trigger_and_Generated_.txt"]], PageWidth → Infinity];
WriteString[StringJoin["Trigger_and_Generated_.txt"], "{"];

i = 1;
Doc = 1;
LoopsPerDoc = 4000;
Sol0 = {};

Timing[Do[
   Clear[iteration, Files];
   iteration = {};
   iteration = OpenRead[StringJoin["Popu_Cohe_Rabi_", ToString[Doc], ".txt"]];
   Files = Read[iteration];
   Close[StringJoin["Popu_Cohe_Rabi_", ToString[Doc], ".txt"]];

   If[j - LoopsPerDoc * Doc > 0,
    Do[
      Clear[s, ΩE, ΩH, ρ13, Rρ13,
       Iρ13, Lista1ΩH, Lista1ΩE, RabiTRabiG, FuncΩE, FuncΩH, t];
      Rρ13 = Interpolation[Take[Files[[i - LoopsPerDoc * (Doc - 1), 6]], {1, 401}]][t];
      Iρ13 = Interpolation[Take[Files[[i - LoopsPerDoc * (Doc - 1), 7]], {1, 401}]][t];
      ρ13 = Rρ13 + ⅈ Iρ13 + $MachineEpsilon;
      s = Sqrt[βE βH ( Abs[ρ13])^2] + $MachineEpsilon;
      ΩE = FunctionInterpolation[
         ΩE0 Cos[s * paso], {t, ti, tf}, InterpolationPoints → 2000][t];
      ΩH = FunctionInterpolation[- ⅈ ΩE0 (βH * ρ13 / s) Sin[s * paso] + ΩH0,
         {t, ti, tf}, InterpolationPoints → 2000][t];

      Lista1ΩH = {};
      Lista1ΩE = {};
      RabiTRabiG = {};

      FuncΩE = ΩE;
      FuncΩH = ΩH;
      t = ti;
      Do[
       Clear[ValorΩE, ValorΩH];
       ValorΩE = FuncΩE;
       ValorΩH = FuncΩH;
       Lista1ΩE = Append[Lista1ΩE, Abs[ValorΩE]];
       Lista1ΩH = Append[Lista1ΩH, Abs[ValorΩH]];
       t2 = t;
       Clear[t, FuncΩE, FuncΩH, ValorΩE, ValorΩH];
       FuncΩE = ΩE;
       FuncΩH = ΩH;
       t = t2 + 0.5,
       {numpasos}];
```

```mathematica
RabiTRabiG = Append[RabiTRabiG, Partition[Riffle[Listatime, Lista1ΩE], 2, 2]];
RabiTRabiG = Append[RabiTRabiG, Partition[Riffle[Listatime, Lista1ΩH], 2, 2]];

Write[StringJoin["Trigger_and_Generated_.txt"], RabiTRabiG];
WriteString[StringJoin["Trigger_and_Generated_.txt"], ","];
Clear[ΩE0, ΩH0, t];
ΩE0 = ΩE;
ΩH0 = ΩH;
i = i + 1,
{LoopsPerDoc}];

, (*Coma entre condicion cierta o falsa del IF*)

Do[

Clear[s, ΩE, ΩH, ρ13, Rρ13,
 Iρ13, Lista1ΩH, Lista1ΩE, RabiTRabiG, FuncΩE, FuncΩH, t];
Rρ13 = Interpolation[Take[Files[[i - LoopsPerDoc * (Doc - 1), 6]], {1, 401}]][t];
Iρ13 = Interpolation[Take[Files[[i - LoopsPerDoc * (Doc - 1), 7]], {1, 401}]][t];
ρ13 = Rρ13 + i Iρ13 + $MachineEpsilon;
s = Sqrt[βE βH (Abs[ρ13])^2] + $MachineEpsilon;
ΩE = FunctionInterpolation[
   ΩE0 Cos[s * paso], {t, ti, tf}, InterpolationPoints → 2000][t];
ΩH = FunctionInterpolation[-i ΩE0 (βH * ρ13 / s) Sin[s * paso] + ΩH0,
   {t, ti, tf}, InterpolationPoints → 2000][t];

Lista1ΩH = {};
Lista1ΩE = {};
RabiTRabiG = {};

FuncΩE = ΩE;
FuncΩH = ΩH;
t = ti;
Do[
 Clear[ValorΩE, ValorΩH];
 ValorΩE = FuncΩE;
 ValorΩH = FuncΩH;
 Lista1ΩE = Append[Lista1ΩE, Abs[ValorΩE]];
 Lista1ΩH = Append[Lista1ΩH, Abs[ValorΩH]];
 t2 = t;
 Clear[t, FuncΩE, FuncΩH, ValorΩE, ValorΩH];
 FuncΩE = ΩE;
 FuncΩH = ΩH;
 t = t2 + 0.5,
 {numpasos}];


RabiTRabiG = Append[RabiTRabiG, Partition[Riffle[Listatime, Lista1ΩE], 2, 2]];
RabiTRabiG = Append[RabiTRabiG, Partition[Riffle[Listatime, Lista1ΩH], 2, 2]];

Write[StringJoin["Trigger_and_Generated_.txt"], RabiTRabiG];
WriteString[StringJoin["Trigger_and_Generated_.txt"], ","];
Clear[ΩE0, ΩH0, t];
```

```
        ΩE0 = ΩE;
        ΩH0 = ΩH;
        i = i + 1,
        {j - LoopsPerDoc * (Doc - 1)}];
    ];
    Doc ++,
    {IntegerPart[j / LoopsPerDoc] + 1}];]
```

{35.6406, Null}

```
WriteString[StringJoin["Trigger_and_Generated_.txt"], "0 }"];
Close[StringJoin["Trigger_and_Generated_.txt"]];

i
```

201