### CALL FLOQUETINIT('qubit','U',2,ID,INFO)

# Initialize the system, prepare memory arrays

D\_BARE = ID%D\_BARE

MODES\_NUM(1) = 1 !(STATIC FIELD)
MODES\_NUM(2) = 1 !(DRIVING BY ONE HARMONIC)

Define modes and harmonics

FIELDS(1)%X = 0.0 FIELDS(1)%Y = 0.0 FIELDS(1)%Z = 1.0 FIELDS(1)%phi\_x = 0.0 FIELDS(1)%phi\_y = 0.0 FIELDS(1)%phi\_z = 0.0 FIELDS(1)%omega = 0.0

Set parameters of the Hamiltonian

FIELDS(2)%X = 2.0 FIELDS(2)%Y = 0.0 FIELDS(2)%Z = 0.0 FIELDS(2)%phi\_x = 0.0 FIELDS(2)%phi\_y = 0.0 FIELDS(2)%phi\_z = 0.0 FIELDS(2)%omega = 1.0 FIELDS(2)%N Floquet = 20

FIELDS(1)%N Floquet = 0

Calculate time-evolution operator

!--- EVALUATE TIME-EVOLUTION OPERATOR IN THE BARE BASIS

T1 = 0.0

T2 = 4.0\*atan(1.0)

CALL TIMEEVOLUTIONOPERATOR(ID,D\_BARE,SIZE(MODES\_NUM,1),MODES\_NUM,FIELDS,T1,T2,U\_AUX,INFO) WRITE(3,\*) T2 ,FIELDS(2)%OMEGA, ABS(U AUX)\*\*2

## CALL FLOQUETINIT('qubit','U',2,ID,INFO)

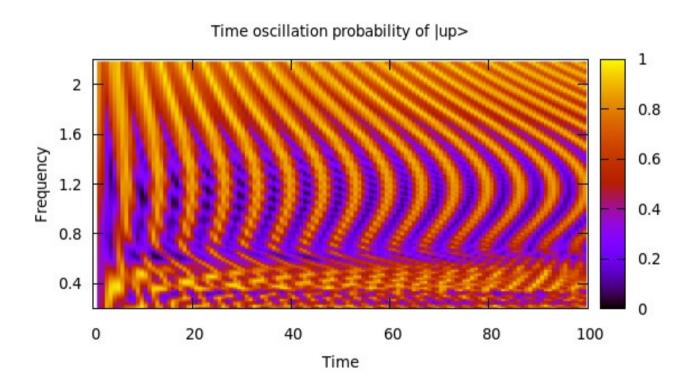
D\_BARE = ID%D\_BARE

MODES\_NUM(1) = 1 !(STATIC FIELD)
MODES NUM(2) = 1 !(DRIVING BY ONE HARMONIC)

FIELDS(1)%X = 0.0 FIELDS(1)%Y = 0.0 FIELDS(1)%Z = 1.0 FIELDS(1)%phi\_x = 0.0 FIELDS(1)%phi\_y = 0.0 FIELDS(1)%phi\_z = 0.0 FIELDS(1)%omega = 0.0 FIELDS(1)%N\_Floquet = 0 FIELDS(2)%X = 2.0 FIELDS(2)%Y = 0.0 FIELDS(2)%Z = 0.0 FIELDS(2)%phi\_x = 0.0 FIELDS(2)%phi\_y = 0.0 FIELDS(2)%phi z = 0.0

FIELDS(2)%omega = 1.0

FIELDS(2)%N Floquet = 20



#### !--- EVALUATE TIME-EVOLUTION OPERATOR IN THE BARE BASIS

T1 = 0.0

T2 = 4.0\*atan(1.0)

CALL TIMEEVOLUTIONOPERATOR(ID,D\_BARE,SIZE(MODES\_NUM,1),MODES\_NUM,FIELDS,T1,T2,U\_AUX,INFO) WRITE(3,\*) T2 ,FIELDS(2)%OMEGA, ABS(U\_AUX)\*\*2

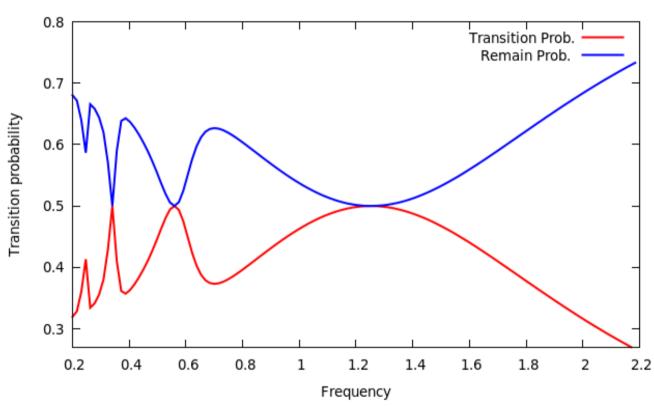
## CALL FLOQUETINIT('qubit','U',2,ID,INFO)

```
D_BARE = ID%D_BARE
```

MODES\_NUM(1) = 1 !(STATIC FIELD)
MODES NUM(2) = 1 !(DRIVING BY ONE HARMONIC)

 $\begin{aligned} & \text{FIELDS}(1)\%X &= 0.0 \\ & \text{FIELDS}(1)\%Y &= 0.0 \\ & \text{FIELDS}(1)\%Z &= 1.0 \\ & \text{FIELDS}(1)\%\text{phi}\_\text{x} = 0.0 \\ & \text{FIELDS}(1)\%\text{phi}\_\text{y} = 0.0 \\ & \text{FIELDS}(1)\%\text{phi}\_\text{z} = 0.0 \\ & \text{FIELDS}(1)\%\text{omega} = 0.0 \\ & \text{FIELDS}(1)\%\text{N}\_\text{Floquet} = 0 \end{aligned}$ 

FIELDS(2)%X = 2.0 FIELDS(2)%Y = 0.0 FIELDS(2)%Z = 0.0 FIELDS(2)%phi\_x = 0.0 FIELDS(2)%phi\_y = 0.0 FIELDS(2)%phi\_z = 0.0 FIELDS(2)%omega = 1.0 FIELDS(2)%N Floquet = 20



#### !--- EVALUATE TIME-EVOLUTION OPERATOR IN THE BARE BASIS

T1 = 0.0

T2 = 4.0\*atan(1.0)

CALL TIMEEVOLUTIONOPERATOR(ID,D\_BARE,SIZE(MODES\_NUM,1),MODES\_NUM,FIELDS,T1,T2,U\_AUX,INFO) WRITE(3,\*) T2 ,FIELDS(2)%OMEGA, ABS(U AUX)\*\*2

```
CALL FLOQUETINIT('qubit','U',2,ID,INFO)
D BARE = ID%D BARE
MODES NUM(1) = 1!(STATIC FIELD)
MODES NUM(2) = 1!(DRESSING FIELD)
MODES NUM(3) = 1!(PROBING FIELD)
FIELDS(1)\%X = 0.0
FIELDS(1)\%Y = 0.0
FIELDS(1)\%Z = 1.0
FIELDS(2)%X
              = 2.0
FIELDS(2)%Y
              = 0.0
FIELDS(2)%Z
              = 0.0
FIELDS(3)\%X = 0.0
FIELDS(3)\%Y = 0.0
FIELDS(3)\%Z = 1.0
CALL DRESSEDBASIS SUBSET(ID, ....)!
T1 = 0.0
T2 = 4.0*atan(1.0)
CALL TIMEEVOLUTIONOPERATOR(ID,D BARE, U BARE ...)
 CALL MULTIMODEMICROMOTION(ID,T1,U1 ....)
 CALL MULTIMODEMICROMOTION(ID,T2,U2 ....)
```

Initialize the system, prepare memory arrays

Define modes and harmonics

Set parameters of the Hamiltonian

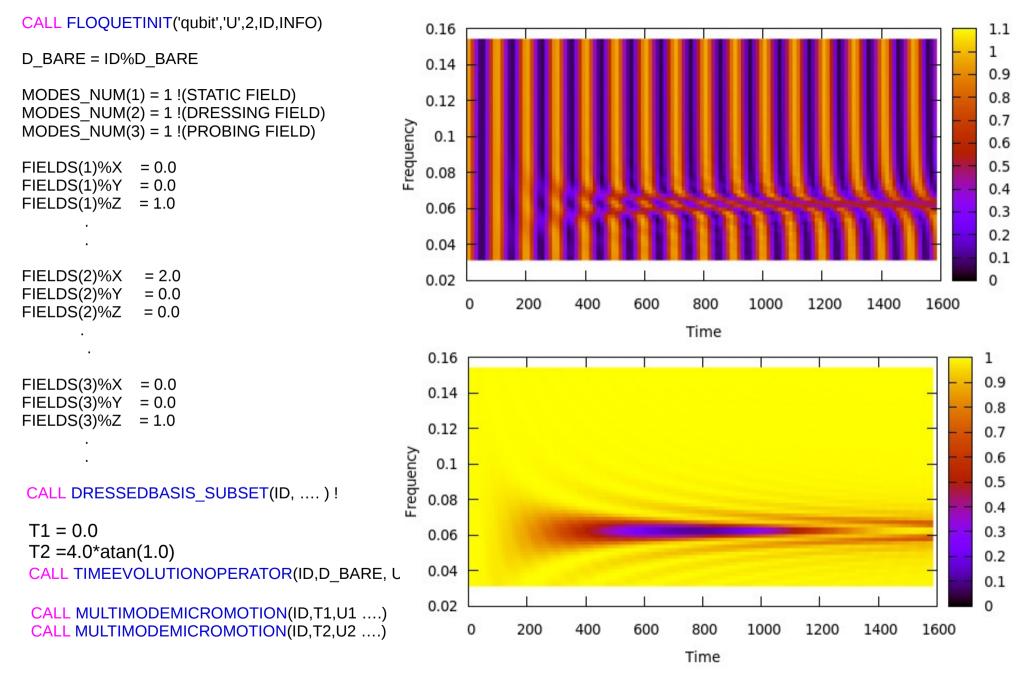
Define the dressing basis

Calculate the time evolution operator bare basis

Calculate micromotion operators

U DRESSED = MATMUL(TRANSPOSE(CONJG(U2)), MATMUL(U BARE,U1))

Calculate evolution in the dressed basis



U DRESSED = MATMUL(TRANSPOSE(CONJG(U2)), MATMUL(U BARE,U1))

```
CALL FLOQUETINIT('Rb87','B',8,ID,INFO)
D BARE = ID%D BARE
MODES NUM(1) = 1!(DC FIELD)
MODES NUM(2) = 1!(RF DRESSING FIELD)
MODES NUM(3) = 1!(MW PROBING FIELD)
FIELDS(1)\%X = 0.0
FIELDS(1)\%Y = 0.0
FIELDS(1)\%Z = 1.0E-4
                                                               87Rb: Population of the upper hyperfine manifold
                                                                        after a short MW pulse
FIELDS(2)%X
                = 2.0E-5
                               0.8
FIELDS(2)%Y
                = 0.0
                               0.6
FIELDS(2)%Z
               = 0.0
                                0.4
                                0.2
FIELDS(3)\%X = 0.0
FIELDS(3)\%Y = 0.0
FIELDS(3)\%Z = 1.0E-7
                                                            1.4912
                                 1.096
                                            1.104
                                                      1.486
                                                                        1.874
                                                                               1.879
                                                                                       2.258
                                                                                                      2.269
                                                                                                                2.653
                                                                                                                       2.659
                                                               MW detuning from hyperfine splitting + v_{RF} (Hz)
CALL DRESSEDBASIS SUBSET(ID, ....)!
 T1 = 0.0
 T2 = 700 E - 6
 CALL TIMEEVOLUTIONOPERATOR(ID,D BARE, U BARE ...)
 CALL MULTIMODEMICROMOTION(ID,T1,U1 ....)
 CALL MULTIMODEMICROMOTION(ID,T2,U2 ....)
```

U DRESSED = MATMUL(TRANSPOSE(CONJG(U2)), MATMUL(U BARE,U1))