Non-secular Lindblad Equation

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Introduction

Application to Floquet Topological system

Application to the Mollow triplet

Meeting with Sdeh Boker physics group 6.4.16

System operator A(t), environment operator B(t)

coupling is $A(t)\cdot B(t)$

Environment is charachterized by its correlation

$$\Gamma(\omega)=\int \langle B(t)B(0)\rangle_E \, e^{i\omega t} dt$$

System has eigenfrequencies ν_j

$$A(t) = \sum_{j=-J,\ldots,J} A_j e^{-i\nu_j t}$$

To 2nd order in the coupling, the reduced density matrix satisfies

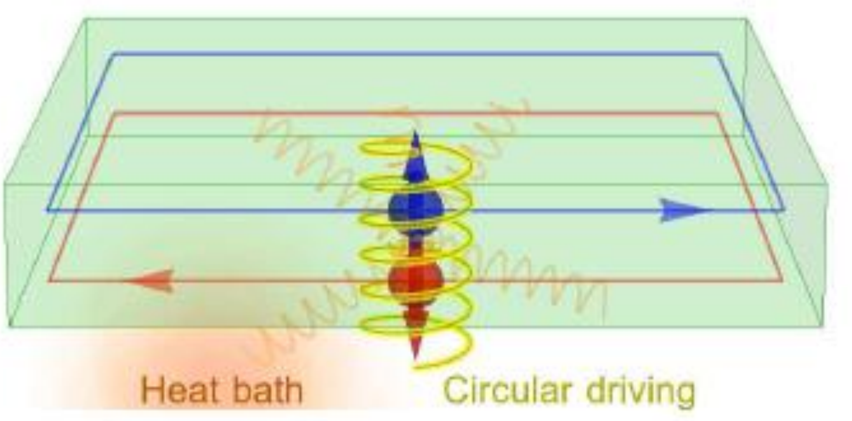
$$\frac{d\rho_S}{dt} = \sum_{j,k} \Gamma(\nu_j) e^{i(\nu_k-\nu_j)t} [A_j \rho_S A_k^\dagger - A_k^\dagger A_j \rho_S] + h.c.$$

The secular case, keeping only k=j is the Lindblad equation,

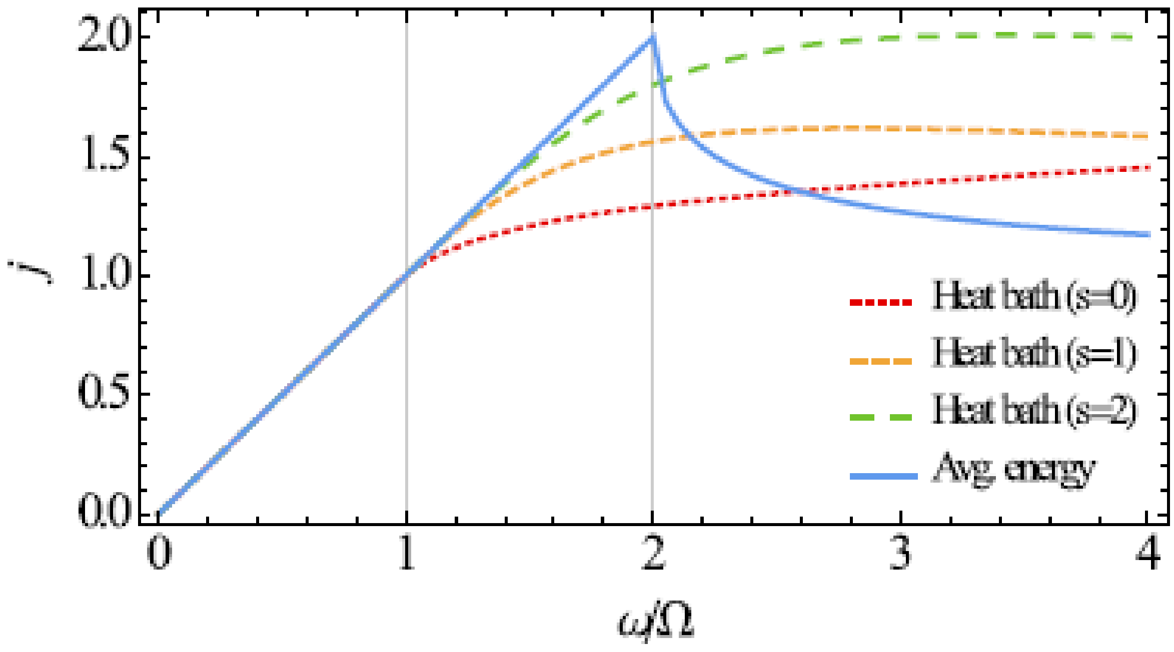
justified only if all $|\nu_k - \nu_j| >> \Gamma$.

Floquet Topological state

S. Vajna, B. Dora, G. Zarand, BH [arXiv:1603.05348]



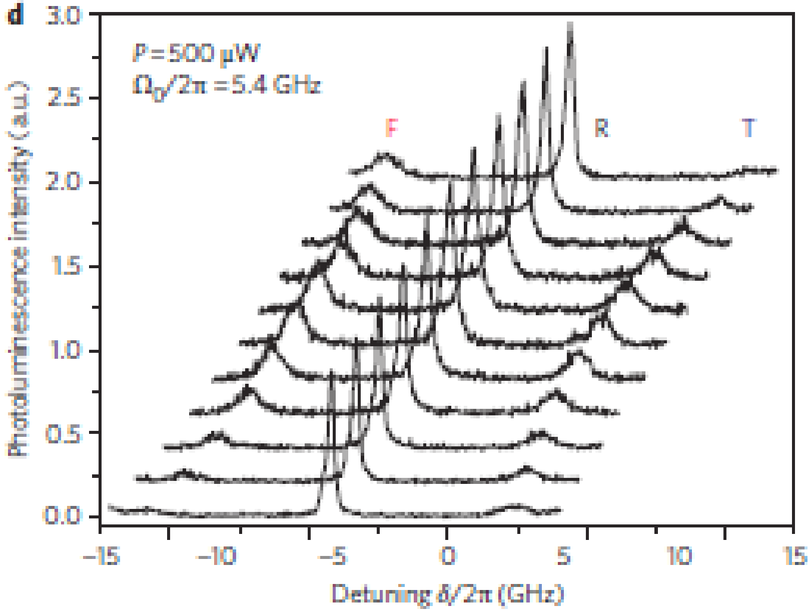
Secular approximation



Non-secular case a sharp crossover.

Mollow triplet

A. Ulhaq et al., Nature Photonics (2012)



Bloch equations:

(1) Lab frame $\Omega << \Gamma$

(2) Relaxation in rotating frame $\Omega >> \Gamma$

Crossover needs non-secular system.