We consider a two-level quantum system subject to repeated interactions with an environment. Namely, the interaction of the system and the environment will be switched on and off for a finite number of times. Consider that the evolution of the system and the environment is described by the rather general Hamiltonian

$$\hat{H} = \hat{H}_{\mathrm{S}} + \hat{H}_{\mathrm{E}} + \hat{H}_{\mathrm{SE}}, \tag{1}$$

where $\hat{H}_{\mathrm{E}}$ denotes the free evolution of the environment, which we leave arbitrary. $\hat{H}_{\mathrm{S}} = \Omega \mathbf{h} \cdot \hat{\boldsymbol{\sigma}}$ is the free Hamiltonian of the two-level system. The spin-environment interaction Hamiltonian is given by

$$\hat{H}_{\mathrm{SE}} = \chi(t) \boldsymbol{\alpha} \cdot \hat{\boldsymbol{\sigma}} \otimes \hat{O}. \tag{2}$$

Here $\mathbf{h} \cdot \hat{\boldsymbol{\sigma}}$ and $\boldsymbol{\alpha} \cdot \hat{\boldsymbol{\sigma}}$ are Pauli observables in the directions $\mathbf{h}$ and $\boldsymbol{\alpha}$ respectively. $\hat{O}$ is an observable of the environment, that is, a self-adjoint operator that also commutes with all observables of the spin.

Finally $\chi(t)$ is a switching function that regulates the rate and intensity of the interactions between the two-level system and the environment. Note that outside the support of $\chi$ the two subsystems evolve independently.